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Rethinking the Reserves

Jacob Alex Klerman

Prepared for the Office of the Secretary of Defense

NATIONAL DEFENSE RESEARCH INSTITUTE

The research described in this report was prepared for the Office of the Secretary of Defense (OSD). The research was conducted in the RAND National Defense Research Institute, a federally funded research and development center sponsored by the OSD, the Joint Staff, the Unified Combatant Commands, the Department of the Navy, the Marine Corps, the defense agencies, and the defense Intelligence Community under Contract W74V8H-06-C-0002.

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Preface

The United States is now engaged in a different type of war—long-term, low-intensity conflicts to stabilize Afghanistan and Iraq. In these stability operations, the Department of Defense (DoD) has made unprecedented use of its Reserve Components (RC). Forces that had previously been viewed as suitable for strategic missions, what we refer to here as the *Strategic Reserve*, and called up less than once in a generation are now being used to manage operational force missions, what we refer to here as the *operational force*, with an expectation of call-up as much as one year in six and, recently, even more frequently.

The changed threat environment and utilization pattern suggest the utility of rethinking our conception of the RC, the level of commitment expected from its members, what roles are assigned to them, and their compensation.

To rethink the role of the reserves and the implications of that rethinking for the size, nature, and compensation of the reserves, this RAND monograph draws together analyses from several RAND projects—past and ongoing. Deliberately making no specific recommendations, it presents some perspectives on the major issues facing the Reserve Components. This monograph is a major expansion and revision of a Project Memorandum prepared for the 2006 Quadrennial Defense Review and circulated under the same name, "Rethinking the Reserves" (not available to the general public).

This monograph should be of interest to the broad defense community—in DoD, in Congress, and more broadly—as the relative cost of the reserves, their size, and their design are reconsidered.

Consistent with this wide intended audience, the presentation here is nontechnical. More-technical information appears in footnotes and in two appendixes.

This research was conducted within the Forces and Resources Policy Center of the RAND National Defense Research Institute, a federally funded research and development center sponsored by the Office of the Secretary of Defense, the Joint Staff, the Unified Combatant Commands, the Department of the Navy, the Marine Corps, the defense agencies, and the defense Intelligence Community.

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Summary

Introduction

The United States is now engaged in a different type of war—long term, low-intensity conflicts to stabilize Afghanistan and Iraq—in which the Department of Defense (DoD) has made unprecedented use of its Reserve Components (RC). Forces that had previously been viewed as suitable for strategic missions, what we refer to here as *Strategic Reserves*, and called up less than once in a generation are now being used to manage operational force missions, what we refer to here as *operational forces*, with an expectation of call-up as much as one year in six and, recently, even more frequently.

This changed threat environment and different utilization pattern suggest the utility of rethinking our conception of the RC, the level of commitment expected from its members, what roles are assigned to them, and their compensation. This monograph provides such a rethinking. The ideas expressed deliberately take very little as given. Transitional and political issues are ignored. Instead, the monograph begins by asking what defines the reserves—that is, what makes the reserves inherently different from the actives. Given the answer to that question, the monograph considers each of the issues raised.

Much of the discussion here concerns the Army. The Army has by far the largest Reserve Component, overall and relative to the size of the Active Component (AC). It is currently being stressed and has recently been well studied. It is the focus of the author's ongoing work.

We leave to others more careful consideration of the extent to which the arguments do or do not apply to the other Services.[1]

What Defines the Reserves?

The essence of the reserves is the *part-time nature* of their service. This part-time nature has three crucial implications:

1. *Citizen Soldiers:* Because reserve duty is only part-time, almost all reservists have a civilian job (or are attending school part time or full time). Inevitably, reservists (and therefore DoD policymakers contemplating using reservists) must juggle the requirements of reserve duty with the requirements of that civilian job (or school). For a given level of compensation, the greater the conflict is between reserve responsibilities and civilian jobs, the fewer the people who would be expected to enlist in the reserves.
2. *Less Expensive*: Because of their part-time nature, reservists simply spend less time in uniform. Therefore, in years in which they are not mobilized, they can be paid less. For the Army National Guard, a very rough estimate is that a drilling reservist is paid for only about one-sixth as many days as an equivalent Active Component solider. Relative costs are slightly higher, perhaps one-fifth to one-third those of the actives (e.g., *Total Force Policy Report to Congress*, DoD, 1990; CBO, 1990; Palmer et al., 1992; CBO, 2005a), but still much less. Thus, in peacetime, reserve units are much less expensive. Given that

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[1] This monograph considers only DoD reserves. The Coast Guard, which is a part of the Department of Transportation, also has reserves. The U.S. Coast Guard Reserve has contributed significantly to the Global War on Terrorism (GWOT), including port security operations in the Iraq theater, but it is not formally a part of DoD. Note, however, that in the event of Total Mobilization, the Coast Guard, including its reserve, would become a part of the Department of Defense. On the Coast Guard Reserve, see Commandant, U.S. Coast Guard, 1996.

On the Coast Guard's role in Operation Iraqi Freedom, see "Iraqi Freedom Fact Sheet," 2005.

the need for military forces varies widely over time, the reserves would appear to be an attractive form in which to hold a surge capacity, paying them full-time only when they are needed full-time. The "in peacetime" caveat is crucial. The relative cost of reservists in wartime involves more subtle calculation and is likely to vary with the frequency of use and rotation policy.

3. *Limited Training Opportunity*: Because reservists are part-time, they may be less capable than AC forces. Because they have only severely limited time available for training in peacetime, reservists often need more time post-mobilization (often several months) to sharpen their existing skills and to learn new skills related to their specific anticipated missions. Despite this intensive post-mobilization training, for some tasks, the skill level (or capability) of reservists and the reserve unit may remain lower than that of AC forces who had the benefit of more-intensive training in the years before deployment. This discussion assumes that military skills atrophy when not training. That assumption seems plausible for military-specific skills (e.g., infantry). Alternatively, when a reservist uses his/her military skills in his/her civilian career (perhaps a chaplain, civil affairs, construction, military police), it seems plausible that the reservist is as skilled as (or even better skilled than) his AC counterpart.

The balance of the monograph considers potential policy changes that follow from the changing security environment and these three aspects of the reserves.

What Is the Relative Cost of the Reserves with Rotation?

The conventional argument for using the reserves rests partly on a significant cost advantage. For DoD, reservists are part-time employees. They can, therefore, be paid less and have a lower operating tempo. The previous literature (augmented with the discussion below) suggests that a reserve unit has costs in the range of one-fifth to one-third those of the corresponding AC unit.

This cost per unit is the appropriate cost concept for units to be used without rotation and with very low probability (i.e., a reserve for deep strategic missions)—the Cold War model—of reinforcing forces for an unlikely war fought using Total Mobilization. Under Total Mobilization, large numbers of reservists would have been mobilized for the duration of the conflict (i.e., no rotation). Note that Total Mobilization never occurred, so costing based only on peacetime relative costs—while ignoring costs in wartime—was approximately appropriate.

Forces were actually used this way in Operation Desert Storm. Large numbers of reservists were mobilized for the duration of the conflict. There was no rotation.

The relevant cost computation, and the implied relative cost, changes radically when forces are expected to be used with rotation, as is the reality in stability operations conducted as part of the ongoing Global War on Terrorism (GWOT). This new reality implies two changes to costing.

First, DoD now expects to use the RC with some frequency, so any cost computation needs to consider both costs in "peacetime" (i.e., when reserve units are not used) and costs in "wartime" (i.e., when reserve units are used).

Second, with rotation, the appropriate cost is not per unit but per unit "Boots on the Ground" (BoG) (i.e., actually serving in the conflict versus at the rotational base at home). According to current policy guidance, AC forces are to be *deployed* about one-third of the time (i.e., one year activated and then two years at home). In practice, AC forces have deployed much more intensively than that (more than half the time). According to current policy guidance, RC forces are to be mobilized about one-sixth of the time (i.e., one year mobilized and then five years not mobilized; however, the Army reserve continues to state a policy of one-fifth). Time deployed is less than time mobilized because of post-mobilization training. In practice, RC forces have also deployed more intensively than that guidance, but the increase in intensity has not been as sharp as for AC forces.

Rotation policy is the crucial input for computing the relative number of units in the force to maintain one unit BoG and then the relative cost of maintaining one unit BoG. According to the official

policy guidance, that ratio is slightly less than three; that is, it takes slightly less than three times as many RC units in the force as AC units in the force to maintain one unit continuously BoG. According to actual recent practice, that ratio is slightly less than four.

These results about the relative number of units in the force can be used to compute the relative cost of the RC and the AC for stability operations. Exact computations are sensitive to assumptions. Crucial considerations include the relative unit cost per unit, expected actual rotation practice when the RC is used (and thus the relative number of units in the force to maintain one unit BoG), and the expected fraction of time that the RC will actually be used intensively.

The key consideration appears to be rotation policy. If we assume current rotation policy, for plausible values of the other parameters, the RC is usually cheaper. However, if we assume that when we next use the RC intensively we will also use the AC as we are using them now, then for plausible values of the parameters, the RC is more expensive than the AC.

Beyond the exact result of these calculations, it seems clear that the relative cost of the RC rises sharply when the projected use involves rotation. What was without rotation a striking cost advantage is nearly cost parity; that is, *cost considerations no longer overwhelmingly favor the RC*. DoD policymakers might want to consider appropriate reactions to such a sharp increase in providing rotational forces using the RC versus using the AC. The standard economic argument would suggest that the appropriate reaction would be twofold. First, decrease demand for the solution whose relative cost has risen sharply; that is, use the RC in fewer roles (e.g., only as a deeper reserve). Second, decrease supply (i.e., cut reserve force structure) by decreasing cost (e.g., reserve enlistment bonuses) until the remaining forces are closer to cost-effective.

Of course, cost minimization of force structure for stability operations is far from the only consideration in choosing force structure. A more complete analysis would need to consider other factors, including the size of the implied Strategic Reserve, state missions, homeland security, the Abrams Doctrine, ability to recruit and retain some alternative force structure, forces for short-warning contingencies, ability to surge above the rotation guidance, and relative military effectiveness.

Many of these factors appear to imply a size of the reserves larger than is implied by simple cost minimization of force structure for stability operations.

How Should the Reserves Be Compensated?

When the reserves were used less than once in a generation, potential reservists could evaluate RC affiliation by considering only peacetime compensation. New DoD policy implies that reservists should expect to be mobilized several times in a career. Given this changed policy, potential reservists need to consider both peacetime and wartime compensation.

Loughran, Klerman, and Martin (2006) have shown that cash compensation rises in wartime. Nevertheless, some available evidence (e.g., the lack of volunteers) suggests that reservists perceive that they are worse off when they are mobilized.

Given that whether one will be mobilized is uncertain and that DoD makes the decision to mobilize, this perception that one is worse off when mobilized is problematic. It probably raises DoD costs. In addition, it gives DoD an incentive to overmobilize reservists, which, in the long run, may lead to retention issues.

One alternative is to increase compensation when mobilizing the reserves to reduce the magnitude of the decline in total well-being when the reserves are mobilized. Recent moves to increase health and education benefits for activated reservists have this effect. Additional special pay for long mobilizations would be a more direct approach.

What Are Some Alternative Models for the Reserves?

The previous analyses of relative cost and compensation assumes the current conventional reserve model: in peacetime, one weekend a month and two continuous weeks (often during the summer) per year; in wartime, mobilization one year in six. Other models for part-time service members are worthy of consideration.

One approach—Extended Reserves—would offer large bonuses to reservists who, having been mobilized once, would volunteer to be mobilized a second time in six years. Because such individuals replace a second reservist, DoD could offer a large bonus and still derive considerable cost savings. We note, however, that such large bonuses might leave DoD open to charges that these reserve forces were "mercenary."

Achieving these cost savings requires shrinking the reserves. How much to shrink the reserves requires knowing what fraction of reservists would accept the bonus. Needing all the soldiers possible, we can easily learn something about the fraction of reservists who would be willing to take a bonus, perhaps simply by mailing bonus offers of varying sizes to a random sample of reservists who have already served and recording response rates.

Another alternative approach to the reserves—*cadre*—would maintain only leaders (e.g., noncommissioned officers and officers above major) in the reserves. Then, when a stability operation began, recruiting would be increased to fill out these cadre units. Allowing a year to decide that a prolonged stability operation had begun, another year for recruiting, another year for Basic Training and Advanced Individual Training, and another year for collective training, these forces could be available in the fifth year of a conflict.

This approach exploits the long lead times available when reserves are used with rotation. Since such a cadre concept would pay most of the force nothing in peacetime, there are potential cost savings. Ongoing work at RAND is exploring the magnitude of the potential savings and details of implementation. Open issues include the appropriate way to cost such units, the extent to which some of the officers and noncommissioned officers could be drawn from the existing force structure (e.g., positions at the U.S. Army Training and Documentation Command [TRADOC]), and how many cadre units additional recruiting could plausibly fill.

Concluding Thoughts

The nation faces a new security reality—stability operations. Given available forces, force concepts, and compensation, DoD has reacted by making unprecedented use of the reserves. Over the intermediate term (i.e., not the current conflict, but the next conflict; perhaps five to ten years out), DoD should respond to this new security reality by rethinking available forces, force concepts, and compensation. The Office of the Assistant Secretary of Defense, Reserve Affairs' Continuum of Service concept begins that rethinking. This monograph suggests some issues and concepts for consideration.

Acknowledgments

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Comments received at seminars (at the Western Economics Association, the National Bureau of Research National Security Workshop) and briefings (before Under Secretary of Defense for Personnel and Readiness David Chu; Assistant Secretary of Defense for Reserve Affairs Thomas Hall; Chief of the National Guard Bureau Lieutenant General H. Steven Blum; Joint Staff Vice Director for Force Structure, Resources, and Assessments Major General Michael Vane, Defense Science Board; and retired Major General Arnold Penaro and the Com-

mission on the Guard and Research; retired Admiral Don Pilling; and the Defense Science Board) also substantially shifted the analysis and discussion.

Abbreviations

AC	Active Component
ADT	Active Duty for Training
AR	Army Regulation
AT	Annual Training
AVF	All Volunteer Force
BAH	Basic Allowance for Housing
BAS	Basic Allowance for Subsistence
BCT	Army Brigade Combat Team
BoG	Boots on the Ground
CBO	Congressional Budget Office
CS	combat service
CSS	combat service support
CZTE	Combat Zone Tax Exclusion
DoD	U.S. Department of Defense
FSA	Family Separation Allowance
FTS	full-time support

GAO	Government Accountability Office; previously General Accounting Office
GWOT	Global War on Terrorism
HFP	Hostile Fire Pay
HMMWV	High Mobility Multipurpose Wheeled Vehicle
IADT	Inactive Duty for Training
IED	improvised explosive device
MCO	Major Combat Operations
MRC	major regional contingency
MRAP	Mine Resistant Ambush Protected
MWR	Morale Welfare Recreation
NDRI	National Defense Research Institute
NTC	National Training Center
O&M	operation and maintenance
OASD/RA	Office of the Assistant Secretary of Defense for Reserve Affairs
ODS/ODS	Operation Desert Shield/Operation Desert Storm
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
ONE	Operation Noble Eagle
OSD	Office of the Secretary of Defense
PCS	permanent changes of station
PRC	Presidential Reserve Call-Up

PX	post exchange
QDR	Quadrennial Defense Review
RC	Reserve Component
REAP	Reserve Educational Assistance Program
RIPTOA	Reinforcement in Place Transfer of Authority
SLAM	RAND Force Structure, Force Levels, and Force Assignment Model
SSC	Service Secretary Call-Up
SWA	Southwest Asia
TRADOC	U.S. Army Training and Documentation Command
USAWC	U.S. Army War College
USERRA	Uniformed Services Employment and Reemployment Rights Act

CHAPTER ONE

Introduction

Background

The Global War on Terrorism (GWOT) has already brought about an unprecedented shift in the use of the reserves. For nearly half a century after the end of the Korean War, the reserves were called up in numbers only twice—once for the 1960 Berlin Crisis (and then never sent overseas) and then in 1990/1991 for Operation Desert Shield/Operation Desert Storm (and then for most reservists only for about half a year). In contrast, since the events of September 11, 2001, the reserves have been nearly continuously supplying very large numbers of service members, often for periods of well over a year. Furthermore, official Department of Defense (DoD) policy and statements imply that this level of active-duty service for the reserves—up to (and evidently sometimes more than) one year in six—is likely to be the norm into the indefinite future (Gates, 2007).

These changes occur in the context of, and in reaction to, a major shift in the dominant security threat facing the nation. A force structure—and, in particular, a set of Reserve Components (RC)—that was designed to fight an unlikely, short-warning, major war (e.g., World War III in the German Fulda Gap or Operation Desert Shield/Desert Storm) is now engaged in a prolonged effort to suppress an insurgency. Issues of time to train-up for short-warning scenarios that were primary in the last set of major reviews of the role of the reserves (e.g., Rostker et al., 1992) have receded; however, issues of operations extending over many years and being conducted with rotation (i.e., an expectation that forces will serve in the combat zone for a limited period of time

and then return home for a period of at least as long before returning, or rotating back, to the combat zone) are now primary. This new security threat has induced a shift in the role of the reserves from that of a Strategic Reserve (i.e., very infrequent conflicts that are either short or conducted without rotation) to that of an operational force (i.e., more conflicts and utilization with rotation). Because this shift is fundamental, it suggests a rethinking of all the characteristics of the reserves, including compensation and terms of service.

This Strategic-to-Operational shift in the role itself is worthy of reexamination. It does not appear to have been the outcome of a deliberate planning process. Instead, the nation has turned to the reserves because it did not have enough Active Component (AC) forces to fight the GWOT and because for several reasons it was unwilling to increase the size of the AC (until recently).

Objective and Scope

All these issues argue for a "rethinking" of the reserves. The balance of this document begins the process of such a rethinking.

Many of the comments in this monograph apply to all six RCs across the Services.[1] Nevertheless, the discussion here focuses primarily on the Army Reserve and the Army National Guard—by far the largest RCs; they are currently being used intensively (Davis et al., 2005). The issues for the Marine Corps reserve appear to be similar. Robbert, Cook, and Williams (1999) provide an analysis of the active-reserve mix choice for the Air Force that is a precursor of many of the ideas

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[1] This monograph considers only DoD reserves. The Coast Guard also has reserves. The U.S. Coast Guard reserve, which is a part of the Department of Transportation, has contributed significantly to the Global War on Terrorism (GWOT), including port security operations in the Iraq theater, but it is not formally a part of DoD. Note, however, that in the event of Total Mobilization, the Coast Guard, including its reserve, would become a part of the Department of Defense. On the Coast Guard reserve, see Commandant, U.S. Coast Guard, 1996.

On the Coast Guard's role in Operation Iraqi Freedom, see "Iraqi Freedom Fact Sheet," 2005.

developed here and comes to similar conclusions (in particular, about the sensitivity of relative cost in the Strategic and Operational roles).

Finally, this document focuses on *intermediate-term* (i.e., not for the current conflict, but for the next conflict; perhaps five to ten years out) issues and considers broad strategies in force design and compensation. The discussion assumes that current force structures and philosophies of dealing with different forces are changeable. Conversely, issues of transforming from any current force structure to some other force structure receive only minimal attention.[2]

Organization of the Monograph

The monograph begins with a very brief description of today's RCs and a review of the reserve's recent history (Chapters Two and Three, respectively).

The core of the monograph then suggests defining the essence of the reserves as a *part-time force* (Chapter Four). Using Army Brigade Combat Teams (BCTs) as an example, Chapter Five considers the cost of the reserves (compared with that of the actives) for a Strategic Reserve role and an operational force role. The document argues that, although the reserves are clearly cheaper than the actives in the Strategic Reserve role, much of the cost gap closes in the operational force role. Furthermore, for some not-implausible parameter values, the reserves are actually more expensive than the actives. Chapter Six considers several alternative types of reserves.

Chapter Seven turns to compensation. It uses a simple economic model of reserve compensation to argue that, given recent utilization patterns, reserve compensation may need to increase and that policymakers should consider increases in mobilization-specific pay rather than increases in enlistment and retention bonuses.

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[2] This is not to deny that these issues are real (e.g., Owens, 2001; or Doubler, 2003). Our analytic approach simply has few insights for these issues.

Chapter Eight draws together the various analyses with some thoughts about the future of the reserves. Two long appendixes provide more detail on the costing analysis and the compensation analysis.

CHAPTER TWO

Today's Reserves

The six components of today's reserve make up more than a third of the total authorized end strength of the U.S. military (as shown in Table 2.1). The reserve's relative size varies widely across the Services, representing more than half of all Army manpower but less than one-fifth of Navy and Marine Corps manpower.

These reserves are available for involuntary active-duty military service under one of four statutory provisions:

- *Service Secretary Call-Up (SSC)*: The Service secretaries have the authority to call up individual reservists involuntarily for up to 15

Table 2.1
Total Force Authorized End Strength (in thousands)

Service	Active	Guard	Reserve	Total	Percentage Reserve
Army	482	350	205	1,037	53%
Navy	353		73	426	17%
Air Force	357	107	74	538	34%
Marine Corps	175		40	215	18%
Total	1,368	457	392	2,216	38%

SOURCE: Office of the Assistant Secretary of Defense for Reserve Affairs (OASD/RA), "Total Force Briefing," review of Reserve Component contributions.

NOTE: Numbers do not sum because of rounding.

days. This authority is primarily intended to give the Services the right to compel attendance at summer Annual Training (AT).

- *Presidential Reserve Call-Up (PRC)*: The President has the authority to augment the active forces by a call-up of up to 200,000 members of the Selected Reserve involuntarily for a period of up to 270 days, to meet mission requirements. The President must notify Congress within 24 hours and state the reason for his action.
- *Partial Mobilization*: The President has the authority to mobilize no more than 1,000,000 reservists (units and individuals from all Services) for 24 months or less, along with the resources needed for their support, to meet the requirements of war or other national emergency involving an external threat to national security.
- *Full Mobilization*: Congress must declare that a state of national emergency exists to call up all reservists. The duration of such a full mobilization is the length of the emergency plus six months. Note that full mobilization implicitly assumes no rotation.

GWOT is being fought under Partial Mobilization. While the statutory authority allows up to 24 continuous months, discussions with OASD/RA suggested that, in practice, there was an attempt to limit mobilization to 24 cumulative months.

CHAPTER THREE

The Modern History of the Reserves

The modern reserves emerge from three policy choices made in the early 1970s as the American commitment to the Vietnam War was winding down, but the Cold War threat posed by the Soviet Union and its allies remained:[1]

1. *The All Volunteer Force*: Following the recommendation of the 1970 Gates Commission, the draft was terminated. In place of the previously conscript-based force, on July 1, 1973, the United States established an All Volunteer Force (AVF).[2]
2. *Total Force Policy*: Secretary of Defense Melvin Laird's 1970 Total Force Policy posited that the reserves were to be an integral part of the nation's military forces.
3. *Abrams Doctrine*: To require the commitment of the nation—in the form of citizen soldiers—for any future conflict, the Abrams Doctrine (1973) placed some crucial warfighting activities in the reserves.[3]

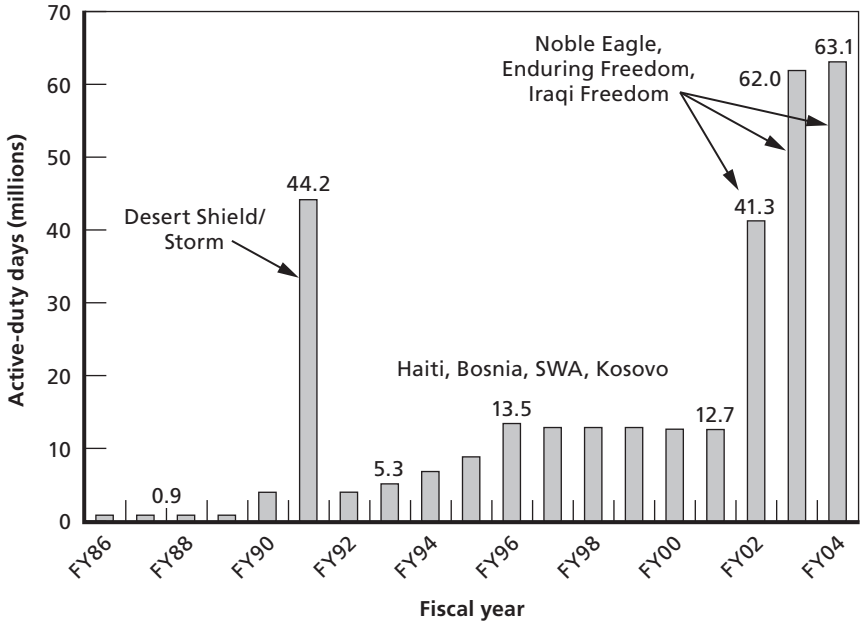
[1] See OASD/RA, 2002, for a related discussion.

[2] On the AVF, see Gilroy, Bicksler, and Warner, 2004.

[3] On the Abrams Doctrine, see Vessey, 1992; Brinegar, 2004; and Betts, 1995, esp. pp. 166–169 and fn 83.

The Cold War ended[4] without any major mobilization of the reserves (the far left part of Figure 3.1). However, as the Cold War was ending, the vision of the reserves shifted again. Operation Desert Shield/Storm (ODS/ODS, late 1991 to mid-1992) was conducted with

Figure 3.1
Utilization of the Reserves



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SOURCE: Reproduced from unpublished figures created by the Office of the Assistant Secretary of Defense for Reserve Affairs (OASD/RA).

[4] The Berlin Wall "fell" in November 1989. German reunification occurred in October 1990.

Presidents George Bush and Mikhail Gorbachev declared the Cold War over at their summit in Malta in December 1989. In April 1990, the Soviet Union passed a law establishing provisions for secession of its constituent republics. The Soviet Union was dissolved in December 1991.

a large, but short (in most cases, less than 180 days), mobilization of the reserves. With the end of that conflict, utilization of the reserves dropped sharply. However, from 1992 to 2000, mobilizations for a series of small contingencies and regular rotations (including Haiti, Bosnia, Southwest Asia [SWA], and Kosovo) kept reserve mobilizations at a level well above its pre-ODS/ODS levels.

The joint Air Force, Navy, and Marine Corps Operations Northern Watch and Southern Watch efforts to enforce "no-fly zones" over Iraq are particularly noteworthy for the discussion that follows.[5] For the Air Force, those operations were a precursor of the current situation for the Army in that those operations required a substantial, ongoing fighter wing presence. They were not conducted as part of a Total Mobilization, so rotation was expected and implemented. The result was a quite large Air Force that had moderate difficulties providing the required fighter force while retaining readiness for other operations. Relatively smaller land operations in Sinai, Bosnia, and Kosovo were—to some extent to the surprise of the Army and DoD—similarly stressful for the Army (Sortor and Polich, 2001). Of course, these operations—and the stress they induced—were quite small compared with what was to come in support of GWOT.

With the events of September 11, 2001, and the ongoing GWOT, overall (though primarily Army and Marine Corps) utilization of the reserves has again surged to unprecedented levels in number of reservists involved, the length of individual mobilizations, and the length of the period of intensive utilization of the reserves as a whole. Reserves were mobilized first for homeland defense (Operation Noble Eagle [ONE]—e.g., air defense and airport security; see Davis et al., 2004), then for Afghanistan (Operation Enduring Freedom [OEF]), and finally for Iraq (Operation Iraqi Freedom [OIF]).

This more-intensive use of the reserves is only partially a result of the post–Cold War "draw down" of forces and the changed external environment. It also represents a change in doctrine.[6] In the nearly

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[5] See Operation Northern Watch, no date, and Tirpak, 1997.

[6] Of course, the change in doctrine appears to have been (at least to some extent) caused by the changed internal environment.

half century between the end of the Korean War and the 9/11 attacks, the reservists were viewed as a *Strategic Reserve*—a force to be called all at once for "total war" against a peer Cold War adversary. Implicitly, service was to be "the duration, plus six months" (i.e., without rotation). Thankfully, that total war against the Soviet Union never occurred. Furthermore, there were only minimal reserve mobilizations for Vietnam.[7]

With GWOT, however, the reserves are being used as an operational force (OASD/RA, 2002): AC forces are being used with rotation. As stress on the actives increases, the reserves have been called in to fill some of the places in the rotation (thereby lowering the stress on the actives). Official DoD policy now puts reservists on notice that they should expect to serve on active duty for approximately one year in five (for the Army reserve) or six (for the Army National Guard). Through early 2007, the Army interpreted that one-year-in-five-or-six policy as one year deployed, plus up to a half year for mobilization, post-mobilization training, and demobilization.

In January 2007, then–new Secretary of Defense Robert M. Gates issued new policy guidance calling for deployments of not more than 12 months, including mobilization, training, and demobilization.[8] While that guidance repeated the one-year-in-six goal (where the one year was total time mobilized, not merely time deployed), it also included the crucial caveat that: "[T]oday's global demands will require a number of selected Guard/Reserve units to be remobilized sooner than the current policy goal. That deployment to demobilization ratio remains the goal of the department, as does the active component's ratio goal of one year of deployment to two years at home station." The de jure terms of the reserve contract have not changed; DoD always had the legal right to mobilize reservists at this level of intensity (or even more intensively). In practice, DoD had not done so; now, however, it is doing so.

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[7] For a detailed, but slightly out-of-date, discussion of reserve call-ups and their voluntary status, see "Major National Guard Call-Ups," no date.

[8] See Gates, 2007. Individual training and post-deployment leave are not included in this 12-month count.

Secretary Gates' January 2007 guidance also requires reservists to be called up as units rather than as individuals.[9] Individual rather than unit replacement has a long history in the reserves. Use of reservists as individual replacements for active units in the Korean War led Congress to ban the practice (see Rostker et al., 1992). That ban posed challenges as DoD actually tried to use the reserves in ODS (private remarks of a senior DoD official from that period). The reserves were used to some extent as individual replacements in GWOT. In addition, there was considerable *cross-leveling* (i.e., transfer of individual service members between reserve units to allow the deployment of traditionally undermanned reserve units) when completely manned units were needed.

Proponents of unit mobilization claim a value of unit cohesion.[10] In addition, there is a technical gain in proficiency and decrease in training time with unit mobilization. Many military tasks occur in teams. With individual mobilization, any team-level training is lost. After mobilization, team-level training will need to be redone with the new teams. Furthermore, mobilizing individuals (or even taking volunteers) early in a conflict "breaks" those units for use as a "unit" later. Some of the unit's members have already served on active duty, so another involuntary mobilization would be inconsistent with rotation guidance.

These concerns about allowing individual volunteers or using individuals for replacement are real. However, bans on individual mobilization have three disadvantages:

1. Requiring mobilization of units increases the burden of reserve duty for reservists. To minimize disruption of civilian life, the Services prefer to mobilize volunteers (or alternatively, to readily grant waivers from "mandatory" mobilizations). Using volun-

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[9] The guidance's language was: "Currently, reserve deployments are managed on an individual basis. In the future deployments will be managed on [a] unit basis, allowing for greater unit cohesion and predictability for training and deployments."

[10] On the importance of unit cohesion, see Wong et al., 2003; Frank, 1991; Vaughan and Schum, 2001; Boer, 2001; Rosen et al., 1999. For a dissenting position, see MacCoun, 1993; MacCoun, Kier, and Belkin, 2006; and Kier, 1998.

teers (and making liberal use of waivers) allows those for whom active-duty service at any point is most advantageous (least burdensome) to serve and those for whom active-duty service would be most burdensome to avoid mobilization. A requirement that reservists be mobilized as units requires that both those for whom mobilization is advantageous and those for whom mobilization would be disadvantageous must serve.

2. Requiring mobilization of units means that reservists can no longer be used as individual replacements for active-duty units.
3. In requiring mobilizations of units, most importantly, it is not clear how reserve units can actually be used, if all mobilizations must be of units. Deploying units are usually required to be at (nearly) full strength. Reserve units recruit in local (rather than national) labor markets. As a result, most reserve units are usually undermanned in peacetime. Furthermore, even fully manned units usually have some nondeployable individuals. Thus, some individual replacement is likely to be required for most deploying reserve units. The natural source for those individual replacements is other reserve units. However, that source appears to be blocked by the new policy.

From where will the missing personnel be drawn? Given that some individuals are always undeployable (e.g., temporary illness, awaiting training), overmanning would be required. One approach is to mobilize whole units and then recombine them. For example, if 75 percent of a unit is deployable, mobilize four units to get three complete units. This strategy mobilizes whole units, but breaks any unit cohesion. Furthermore, this strategy will not work if the number of units to be mobilized is small (in our example, two or less).

CHAPTER FOUR

What Defines the Reserves?

The previous two chapters have briefly described today's reserves and their modern history. The balance of this monograph considers changing the nation's reserve forces to better meet the nation's evolving military challenges. To do so, it is useful to start by asking: What defines the reserves?

The essence of the reserves is the *part-time nature* of their service. This part-time nature has three crucial implications:

1. *Citizen Soldiers*: Because reserve duty is only part-time, almost all reservists have a civilian job (or are attending school full time or part time). It follows that reservists (and, therefore, DoD policymakers contemplating using reservists) must juggle the requirements of reserve duty with the requirements of that civilian job (or school).[1] For a given level of compensation, the greater the compatibility between reserve responsibilities and civilian jobs, the more people would be expected to enlist in the reserves.
2. *Less Expensive*: Because they are part-time, reservists simply spend less time in uniform. Therefore, in years in which they are not mobilized, they can be paid less. For the Army National Guard, a very rough estimate is that a drilling reservist is paid for only about one-sixth as many days as an equivalent active-duty force

[1] Any reservist holding a civilian job faces a potential conflict between that job and reserve duty. For reservists in "critical civilian jobs," the Department of Defense has created special procedures including "mobilization exemptions" and a new hire process. For more on this program, see "Ready Reserve Key Employee Screening Exception Process," 2003.

solider.[2] Relative costs are slightly higher, perhaps one-fifth to one-third those of the actives,[3] but still much, much less than the cost of the actives. Thus, *in peacetime*, reserves are much less expensive. Given that the need for military forces varies widely over time, the reserves would appear to be an attractive form in which to hold a surge capacity—paying them full-time only when they are needed full-time. The "in peacetime" caveat is crucial. As we discuss below, the relative cost of reservists in wartime is subtler and likely to vary with the frequency of use and rotation policy.

3. *Limited Training Opportunity*: Because reservists are part-time, they may be less capable than AC forces.[4] *During peacetime*, they train much less than AC forces (perhaps one-sixth as much[5]).

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[2] Active-duty forces receive 360 days of basic pay; reserve forces receive about 63 days of basic pay—two weekend days per month at double pay (two drill periods per day) and 15 days (i.e., two continuous weeks, often during the summer). Not every reservist participates in every drill. Some reservists train slightly more intensively. Drilling reservists receive only minimal Basic Allowance for Housing (BAH) and Basic Allowance for Subsistence (BAS). Until recently, they received no health benefits. The recent TRICARE Reserve Select program allows them to buy into the TRICARE system, DoD's health insurance provider. Reserve retirement is considerably less generous (i.e., much lower accrual rates) than for active-duty forces.

These personnel costs are only one component of the total differential cost of alternative force structures. Other components of cost not included in this calculation include initial bonuses and other costs of recruiting, ongoing training, other noncash benefits (e.g., child care; the one-sixth estimate includes a rough approximation of health care and retirement), base infrastructure, full-time support for reservists, and equipment. Therefore, this estimate should be viewed as only a very rough approximation. It is used here for illustrative computations. Even whether this one-sixth estimate is too high or too low is unclear. More research on total costs is clearly needed.

[3] The "Relative Cost per Unit" section of Appendix A includes a discussion of considerations in selecting an appropriate concept and a review of the previous literature.

[4] See Congressional Budget Office (CBO), 1990; the papers in Gotz and Brown, 1991; and Robbert, Cook, and Williams, 1999, for similar perspectives.

[5] AC service members are paid 360 days a year. If we assume they actually work (i.e., train) five days a week and we deduct 20 days for paid vacation, that leaves 237 days. RC service members train two days a month and two continuous weeks during the summer—about 39 days. AC service members do not train every day; however, RC weekend drills lose considerable time for travel, setup, and shutdown.

> Thus, at mobilization, they are often capable of doing only a more limited range of mission-essential tasks. Rather than training intensively *during peacetime*, *after mobilization*, reservists often need more time (often several months) to sharpen their existing skills and to learn new skills related to their specific anticipated missions. Despite this intensive post-mobilization training, for some tasks, the skill level (or capability) of reservists and the reserve unit may remain lower than that of AC forces, who had the benefit of more-intensive training in the years before deployment. This discussion assumes that military skills atrophy when not training. That assumption seems plausible for military-specific skills (e.g., infantry). Alternatively, when a reservist uses his/her military skills in his/her civilian career (perhaps a chaplain, civil affairs, construction, military police), it seems plausible that the reservist is as skilled as (or even better skilled than) his/her AC counterpart.

The balance of this monograph considers potential policy changes that follow from the changing security environment and these three aspects of the reserves.

The remaining chapters of this monograph consider demand for and then supply of the reserves. Chapters Five and Six consider the demand side. Given the current implicit reserve contract (i.e., peacetime training of one weekend a month and two continuous weeks [often during the summer] per year; expectation of mobilization of approximately one year in six) of the reserves, Chapter Five considers the cost of the reserves relative to the cost of the actives. Then, Chapter Six considers alternative organizations of the reserves, how many such unconventional reserves DoD might want, and how it might use them. For clarity of exposition, this demand-side analysis (mostly) ignores supply issues.

Then, Chapter Seven turns to the "supply side," to the individuals considering the AVF who have the choice of whether to enlist in and remain in the reserves. Changes in uses of the reserves are likely to shift individuals' willingness to enlist and reenlist. Changes in the desired size of the reserves will affect how many people need to be induced to

enlist and reenlist. In the AVF, a primary way to affect this willingness is compensation policy. Chapter Seven considers how reserve compensation might be modified to better support new policy that makes more intensive use of the reserves.

CHAPTER FIVE

What Is the Relative Cost of the Reserves?

Military forces serve a variety of roles in the national military strategy. Given the implications of the reserves' part-time nature, some roles are more appropriately assigned to AC forces, and other roles are more appropriately assigned to RC forces. Inasmuch as reserves are cheaper (see below), there is a strong advantage to assigning them all the roles that they can perform.

Reading the existing literature on the role of the reserves,[1] one might have thought that the reserves would have a larger role in stability operations than they had in (plans for) a major war (e.g., World War III in the Fulda Gap). Consideration of the cost of the reserves in roles involving rotation appears to suggest otherwise.

The Cold War and Post–Cold War Role of the Reserves

The conventional analysis of the cost of the reserves—and, therefore, of their role—was in the context of Total Mobilization. In the Cold War scenarios of a two-front war (Europe and Korea) and the post–Cold War scenarios of Two Major Theater Wars (presumably Korea and Southwest Asia), reserve combat service (CS) and combat service support (CSS) forces would be needed nearly immediately and reserve combat forces were to serve as follow-on forces.[2]

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[1] See, for example, Rostker et al., 1992.

[2] See Rostker et al., 1992; Larson, Orletsky, and Leuschner, 2001.

Crucially for our analyses, force-structure decisions were made under an assumption of no rotation. There were (approximately) enough forces to meet the projected threat. There were not enough forces for rotation. Instead, it was implicitly assumed that all forces would deploy as soon as possible and stay for the duration—the pattern in World War II.[3]

Given the assumption of use without rotation, the appropriate cost concept and force sizing follow directly. The requirement is for "units" in the Total Mobilization force. Total Mobilization is rare; once it occurs, cost is a secondary issue. Therefore, the crucial question for costing is the cost of an RC unit in peacetime relative to the cost of a comparable AC unit in peacetime (the next few sections carefully consider the appropriate definition of *comparable*). The RC is defined by its part-time nature. Part-time service members (i.e., the RC) can be and are paid much less than full-time service members (i.e., the AC). Studies from the early 1990s suggested that, in peacetime, an RC unit cost one-third to one-fifth the cost of a similar AC unit.[4]

This is a huge cost differential. It suggested moving as many tasks as possible—and the corresponding force structure—to the RC. In these analyses, the key issue was: Which tasks can the RC do? As we noted earlier, the RC is cheaper because it does not train as intensively in peacetime (i.e., it only trains part-time). As a direct consequence, RC units need additional intensive training after mobilization, but before deployment. The key issue was therefore: For which tasks can the RC be ready "in time"?[5]

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[3] Note, however, that it had not been the pattern in Vietnam, in which units served combat tours and then were rotated out.

[4] Again, the "Relative Cost per Unit" section of Appendix A includes a discussion of considerations in selecting an appropriate concept and a review of the previous literature.

[5] See, for example, the *Total Force Policy Report to the Congress* (DoD, 1990). Sortor, 1995, has a thorough discussion of this approach for combat, as well as for CS and CSS units. Lippiatt et al., 1992 (p. 31), are representative:

> Using the methodology to predict when various units can be ready to deploy, we can determine which deployment requirements to a given theater can be filled by RC units and which by AC units. This distinction is important, since RC units are less expensive to maintain than are AC units. However, RC units take longer to deploy.

For CS and CSS units, RC train-up times were a few weeks (sometimes days), which was often faster than lift (i.e., ships to move troops and equipment to Europe, Korea, and, later, Southwest Asia). Much CS and CSS could be and therefore was located in the RC. Placing such units in the RC yielded considerable cost savings. For combat forces, train-up times were measured in months—well after the projected halt phase of any war. Most combat forces were therefore located in the AC, with RC combat forces designated for the roll-back phase or as a Strategic Reserve.

Two reactions to the ODS experience further limited the role of the reserves (see CBO, 1997). First, the slow speed with which the nation was able to deploy forces to the Gulf induced a series of initiatives to speed deployment. These initiatives included lighter and, therefore, more easily transported forces (e.g., the Stryker Combat Vehicle[6]), prepositioning of equipment, and the acquisition of additional mobility assets (transport planes and Fast Transport Ships).[7] This increase in mobility eliminated much of the window in which reservists had been expected to train up.

Second, during ODS, train-up time for the 48th Infantry Brigade of the Georgia National Guard (a Roundout Brigade; in this period, some active divisions were composed not of three active brigades but, instead, of two active brigades and one reserve brigade to complete, or round out, the division) was much longer than was implied by official plans. What exactly happened during the training for the Georgia National Guard during ODS was the subject of considerable controversy; nonetheless, train-up time appears to have grown from well under the two months (42 days) in the pre–Desert Storm period (see GAO, 2000) to at least three months (and perhaps much more).[8] This change also limited the utility of the reserves.

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[6] On the Stryker Combat Vehicle and its relation to mobility, see Vick et al., 2002.

[7] On mobility initiatives, see CBO, 1997.

[8] On the controversy about what happened during Operation Desert Storm, see the negative evaluation of the National Guard Enhanced Combat Brigades in Betts, 1995 (pp. 189–194 and fns 23 and 24). On the controversy at the time, see "The Little Unit That Couldn't," 1991. See also Daniel B. Woods' "National Guard's Fitness for Role in War Debated," 1991,

We conclude this discussion with two notes about the relative cost estimates. The first note concerns equipment. For Total Mobilization, all the units will be used simultaneously; therefore, each unit needs to have its own equipment, and any relative cost comparison needs to include equipment. The higher that equipment costs are relative to personnel costs, the higher will be the cost of the RC relative to the AC. Over time, equipment costs have risen (apparently, faster than personnel costs). Reserves are, thus, most attractive when there is surplus equipment, as there often is at the end of a war (e.g., World War II and the Cold War). The end of the war is also a time of large outflows of personnel from the AC, so filling the RC is fairly easy. This is not the situation today: The AC is stable (or, in the Army, growing), and there is little surplus equipment[9]—conditions that are unfavorable to the RC.

The second note concerns military effectiveness. A unit-for-unit cost comparison implicitly assumes that, once trained-up, RC units are as effective as AC units. In many military forums, it is considered

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from before the training. Careful RAND analysis of training schedules suggested a best-case train-up time of 90 days for a reserve combat brigade (Lippiatt et al., 1996; see also Lippiatt, Polich, and Sortor, 1992; Lippiatt et al., 1992; and Lippiatt, Crowley, and Sollinger, 1998). Changes to Army doctrine and practice might have shrunk that time (e.g., Bold Shift; on Bold Shift, see Lippiatt, Polich, and Sortor, 1992, and Sortor et al., 1994). Less-than-optimal implementation would lengthen the time required for training. With Bold Shift, Lippiatt, Polich, and Sortor, 1992 (p. 35), estimated post-mobilization training times for heavy units as follows: "Optimistic," 79 days; "Intermediate," 104 days; "Pessimistic," 128 days.

These estimates apply to heavy brigades. It appears that the time required for training is shorter for light units and for units deploying at less than brigade scale (e.g., battalion or company; see Lippiatt, Crowley, and Sollinger, 1998).

On the change in estimates, see General Accounting Office (GAO; now Government Accountability Office), 2000, which notes that National Guard Enhanced Brigades had a readiness goal of 42 days and had been so listed since before they were formed. The "nearly three months" in the body of the document follows GAO's (2000, citing RAND) estimate of 75 to 80 days. That estimate assumed higher peacetime readiness than actually occurred. These estimates are consistent with the ODS experience of 72 and 78 days to certification as ready to deploy.

[9] This situation is in part due to the remain behind equipment (RBE) that has been left in theater to continue to sustain the forces. For the most current equipment (e.g., the MRAPs [Mine Resistant Ambush Protected vehicles] being procured against improvised explosive devices in Iraq and elsewhere), shortages are likely to be the norm.

impolite to raise this issue, so such discussion appears to go on only in private and with little direct evidence.

When a skill is "binary" (i.e., you have it or you do not), it seems appropriate to discuss time to train-up. However, many skills are not binary. The more you do them, the better you get at them. Often, the curve will "have a knee"; i.e., with early repetitions, the improvement is faster than with later repetitions. Nevertheless, there will often be additional improvement with additional practice. In addition, we often expect deterioration of skills with time, so the appropriate measure is not (only) lifetime repetitions but also recent repetitions.

If this analysis is correct, then it seems likely that there are several different types of military jobs. For some jobs, civilians actually get more repetitions than uniformed individuals (perhaps civil affairs, police, Navy Seabees who work in construction in the civilian sector). For these tasks, we would expect the RC to perform better than the AC. For activities for which deterioration of skills is slow, older RC members might perform better than younger AC members. (This has been claimed for pilots and flying hours.) However, for military-specific activities for which the skills deteriorate (perhaps physical condition or reaction times in combat simulations), one might expect more-intensive and longer-term AC training to yield higher proficiency than would short-term train-up immediately post-mobilization.

Whether these conjectures are correct is unclear. We are unaware of any high-quality empirical evidence. It might be possible to develop such high-quality empirical evidence. One might compare immediate predeployment scores for the RC and AC on physical condition, marksmanship, tank gunnery, and field exercises (e.g., at the combat training centers). With the caveat that these (relatively) easily measurable outcomes are not the only ones relevant to combat effectiveness, these studies might provide useful information. Any evidence of differential combat effectiveness should be used to adjust the earlier unit-for-unit cost estimates. Thus, for example, if it would take five RC units to do the work of four AC units, then the RC costs should be adjusted up by a quarter. Note also that each unit—AC and RC—would require equipment, so equipment costs would need to enter into this analysis.

Stability Operations

With the events of 9/11 and subsequent American deployments to Afghanistan and Iraq, the stressing force scenario changed from a short-warning conflict to multiyear stability operations. The logic of the pre-GWOT force-assignment rule would appear to suggest that such stability operations were the ideal task for the reserves. Long stability operations are performed with rotation. Rotations last at least six months, often a year (or more). Thus, there was more than enough time to "train up" the reserves. Using the pre-GWOT planning rule, all stability operation tasks could be assigned to the reserves. Inasmuch as we are currently sizing the Total Force to be able to support large and prolonged stability operations, it might be possible to move substantial force structure (and personnel) from the actives to the reserves. If the movement was unit for unit, the result would be substantial cost savings. Part-time units are cheaper per unit than full-time units.

This line of analysis is consistent with the pre-GWOT planning *heuristics* (i.e., rules of thumb and the like). It also appears to be wrong. GWOT is being fought with rotation. When forces are used with rotation, the crucial comparison is no longer the cost of an RC unit in peacetime compared with the cost of an AC unit in peacetime. Instead, the crucial comparison is: What does it cost to maintain one RC unit BoG compared with the cost to maintain one AC unit BoG?

Thus, for stability operations fought with rotation, the crucial limitation of the RC is not train-up time but the fraction of time mobilized. Short of Total Mobilization, the reservists are primarily civilians. To keep reserve affiliation consistent with civilian employment, reservists can be mobilized only for a true emergency,[10] and not "too often" or for "too long." These considerations suggest that it is reasonable to rotate an AC unit into theater much more frequently than it is reasonable to rotate an RC unit into theater. RC time in theater is further limited by the need for post-mobilization training.

The crucial question becomes: What is the ratio of RC units in the force to AC units in the force to maintain one unit continuously

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[10] See the statutorily defined four levels of mobilization discussed in Chapter Two.

BoG? For Army BCTs, Appendix A provides some illustrative calculations using plausible parameter values. Given current *rotation policy*, those calculations suggest that the ratio is slightly less than three RC units in the force for every AC unit in the force in order to maintain one unit BoG. Given recent actual *rotation practice*, the ratio is slightly less than four.

Again using plausible parameter values, Appendix A then proceeds to convert these estimates of units required in the force into relative costs. Those computations suggest that, for wars fought with rotation, much—but not all—the RC's cost advantage disappears. Remaining cost differences are sufficiently small that some might argue that they are not commensurate with the RC's lower combat effectiveness. Furthermore, for some plausible parameter values, the RC is actually more expensive, and sometimes *much* more expensive. This conclusion, that Army reserves for combat operations are not clearly cheaper than AC forces in similar units, is consistent with earlier work by Robbert, Cook, and Williams (1999) on similar issues for the Air Force. Exact computations will require a better cost model than the simple one in Appendix A and precise assumptions about projected rotation practice and the frequency of using the reserves.

This analysis suggests that the cost-effectiveness of the reserves will vary with projected rotation practice. However, rotation practice is not a direct policy choice. We chose force structure based on some projection of future conflicts. Once a force structure has been chosen, those conflicts do (or do not) emerge. The President and Secretary of Defense make a decision to engage forces. Combatant commanders identify a requirement. The Joint Staff designates a Service to fill the requirement, and that Service provides forces to satisfy the requirement. Thus, rather than being chosen directly, rotation practice is specified such that the existing force can meet the demands of combatant commanders (up to any denial of a combatant commander's stated requirements by the Secretary of Defense).

The discussion of the previous paragraph is correct, but for two too-simple reasons. First, in the short term, DoD does not always grant every combat commander's request for forces. Second, in the intermediate term, how much force structure is a choice: If and when the

projected ongoing demands of combatant commanders for forces rise (fall), the nation could increase (decrease) force structure.

During the mid-1990s, combatant commanders' requests for forces and existing force structure implied rotation practice much, much more intensive than stated rotation guidance (and probably above what had been imagined short of Total Mobilization and no rotation). Active rotation practice was allowed to rise from the stated policy of one year deployed for every two (or more) years at home, to less than one year at home for every year deployed. At that rotation practice, many requests from combatant commanders (in particular, in Afghanistan) were denied. In addition, after several years of intensive utilization, in 2006 the President requested and Congress approved a modest increase in the size of the active Army.

Formal force planning for the future would require a careful projection of the distribution of likely force requirements. How often will we need ten brigades? 20 brigades? 30 brigades? And for how long will we need them? Once we establish this distribution of "demand," it is possible to compute (probably simulate) the implied rotation practices and force cost of various force structures. RAND's SLAM (Force Structure, Force Levels, and Force Assignment Model) computer program is designed to perform such analyses.[11] Given explicit statements about the likelihood, duration, and force requirements of future conflicts, the system computes the cost (in peacetime, in wartime, and on average) and the fraction of time with various rotation practices. That information provides an explicit and formal way to understand the implications of various force structures.

Other Unit Types

The analysis in Appendix A is BCT-specific. Furthermore, it appears that the relative cost computations are least favorable for Army combat forces. Ongoing analyses suggest several factors that imply more favorable relative cost computations for Army CS and CSS forces:

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[11] See Klerman, Ordowich, Hickey, and Bullock, 2007.

1. It appears that other unit types have lower peacetime relative cost (e.g., less full-time support [FTS], lower operation and maintenance costs, lower ammunition costs).
2. As noted earlier, other unit types appear to require less post-mobilization training. This smaller training requirement appears to be the result of some combination of (i) slower depreciation of military-specific skills; (ii) maintenance of military-specific skills in civilian jobs; and (iii) smaller units (requiring less simultaneous full-unit training and less senior leadership training).
3. Combat units have no "direct output" when training; i.e., more RC training does not imply less work for the AC or for contractors. The opposite is true for some reserve units. Airlift "training" actually moves people and cargo. Pilot "training" could be flying an unmanned aerial vehicle.
4. Some would argue that RC combat units are less effective militarily than the AC. One hears those arguments less about CS and CSS units.[12]

Implications for Force Structure

We do not choose force structure to minimize cost for performing stability operations, so these cost computations do not determine force structure. BCTs and military forces more generally serve many roles. Some roles favor the RC (e.g., state missions and homeland defense, a larger Strategic Reserve, the Abrams Doctrine). Some roles favor the AC (e.g., short-warning scenarios, surging above the policy, perhaps military effectiveness). Some perspectives favor a more balanced force (e.g., feasibility and cost of recruiting and retaining forces). The costs underlying the computations in Appendix A are rough estimates.

Nevertheless, this analysis suggests that the shift to a rotational scenario has substantially increased the relevant cost of the reserves.

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[12] Conversely, for Air Force pilots, there is some evidence of greater military proficiency in the RC (usually explained by more total flying hours and more flying hours for the same "teams"). Similarly, for the Army, some have argued that more-mature reservists performed better in the stabilization tasks in Iraq.

The standard economic argument would suggest that the appropriate reaction would be twofold. First, decrease demand for the solution whose relative cost has risen sharply; that is, use the RC in fewer roles (e.g., only as a deeper reserve). Second, decrease supply (i.e., cut reserve force structure) by decreasing cost (e.g., reserve enlistment bonuses) until the remaining forces are closer to cost-effective. Further study is needed.

CHAPTER SIX

Unconventional Reserves

The previous chapters have considered the "conventional reserve" pattern. In peacetime, such conventional reserves train at moderate intensity—*conventionally*, "one weekend a month and two continuous weeks during the summer," perhaps slightly more. In wartime, this conventional reserve is mobilized for a year, and then only one year in six. This *conventional reserve* pattern represents only one possible form for reserves (i.e., part-time soldiers).

In this chapter, we discuss some "unconventional reserve" options and how such unconventional reserves might be compensated. These unconventional reserves are consistent with the posited intrinsic nature of the reserves—their part-time service. They are, however, inconsistent with the current statutory environment. Implementing them would probably require changes to the Services' authority to mobilize the reserves and the way they compensate them.

When considering these unconventional reserves, it is useful to think of them not as replacing conventional reserves but as being alternative forms of reserve service. The current reserve model is (nearly) uniform. Limited available evidence ("guard bums," ongoing analyses of reserve participation in the Air Force and in the other Services in the pre-GWOT period, and conjoint analyses[1]) suggests that the desired level of reserve duty and compensation for that duty varies widely across the (current and potential future) reserve population.

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[1] See Loughran, Klerman, and Martin, 2006. On conjoint analysis results, see Lien et al., 2006.

Option A: Intensive Reserves[2]

In the conventional pre-GWOT analysis, the key limitation of the reserves was the time required for post-mobilization training. Nominally, that time was at least 42 days.[3] The ODS experience, RAND analyses,[4] and more recent experience under GWOT suggest that the true time for Army combat forces is somewhere between two and three months.

Reserves would be more useful in the short-warning role if they could train up earlier. If reservists trained more intensively in peacetime, they could deploy earlier in wartime. Currently in peacetime, many Air Force reservists train at an intensity well above the Army's expected one weekend a month and two continuous weeks (often during the summer) per year.

One approach would be to ask: How much would reservists have to train so that at the end of the training they were ready to deploy immediately? Reservists currently train 39 days per year. Current post-mobilization implies about another 45 days of post-mobilization training. It therefore seems plausible that an RC unit that trained continuously for 60 to 90 days in a year might be able to deploy immediately after that training. Assuming that they signed a contract to stay in the

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[2] The labels for these concepts were developed for this monograph. The natural label—*Enhanced Reserves*—was already used in the mid-1980s for reserve units with slightly more-intensive peacetime training.

[3] See, for example, Doubler, 2003 (p. 284), on the 48 Georgia Roundout Brigades:

> Consequently, the 48th Brigade required forty-six days to achieve established readiness standards for training. The brigade estimated before the callup that it would require a maximum of forty-two days of additional training after mobilization. Considering the brigade had not counted on training without support from the 24th Division, its pre-Desert Shield training estimate very closely approximated the actual training program that unfolded at Fort Stewart and the NTC.

More generally, see the summary comment in Lippiatt et al., 1996 (p. 1):

> It took considerably longer to prepare these brigades for deployment than many had anticipated, given that they were the most combat ready units in the Guard.

[4] For example, Lippiatt et al., 1996, even with optimistic assumptions about personnel turnover and individual training and readiness.

reserves for some period after the training, it seems plausible that such units could deploy within days for the next few months

This analysis suggests that cost savings are possible and that, therefore, there are large funds available for bonuses to join such *Intensive Reserve* units. Suppose that Intensive Reserve training required 90 days and that, while training, Intensive Reservists were paid the same as AC service members. Then, we could train four units a year. The last two of these units to have completed training should be available in days; the two units before that (or the one currently in training) should be available in a few weeks (either refresher training or completing current training).[5] Thus, four units could replace somewhere between two and four AC units. If they replaced only two AC units, a bonus equal to three months of basic pay would be cost-effective. If they replaced all four AC units, a bonus equal to nine months of basic pay would be cost-effective. Of course, this (and other similar computations later in this chapter) is only a very rough calculation. Before proceeding, more formal analyses, considering more cost components, would be needed.

Although this option is logically possible, it does not seem attractive in the current environment. Today, a large enough short-warning force does not appear to be a major concern. The conventional threat in Korea appears to have receded, and South Korean forces have become more capable. Iraq no longer provides a major armor threat. With the apparent improvement in the capabilities of precision munitions, the Air Force's ability to harass or even halt enemy armor and motorized movements has improved.[6] Thus, AC forces needed for a base for stability operations with rotation appear to include more than enough forces for any plausible short-warning major regional contingency.

How many people would sign up for such service is also unclear. Because the conventional civilian employment contract gives two or more weeks of vacation, conventional reserve service is compatible with

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[5] See Watson, 1950 (pp. 363–366), for General of the Army George C. Marshall, Jr.'s, use of similar logic in a plan to demobilize the National Guard while inducting new draftees. The demobilized National Guard units would, at least for some interval, maintain a relatively high level of readiness even after demobilization.

[6] Hoehn et al., 2007.

two weeks of summer duty. That leaves two weeks of vacation with the family. How would a reservist combine more than two weeks of continuous training with conventional civilian employment? At four weeks, there is no vacation time with the family, often leave without pay from the civilian employer, and perhaps loss of the job. Some civilian employment may be compatible with this model. DoD would probably benefit from identifying civilian employment that is compatible with this type of reserve service and then recruiting more intensively from that population. Integration with seasonal employment is one possibility (e.g., ski instructors, summer-camp operators, firms with a large Christmas surge).

Note also that such an Intensive Reserve would allow removing the requirement that members of reserve units live near each other. On one side, it seems unlikely that many local areas would have enough people willing to sign up for such an Intensive Reserve to support a local unit. On the other side, with 60 or more days of continuous training, there is no need for local units. Units could be formed for each training session.

From anywhere in the nation, current reservists could sign an "Intensive Reserve" contract committing them to the period of intensive training and involuntary mobilization for the following 12 months. These reservists would need to have once received Basic Training and Advanced Individual Training. The natural pools for such units are people who have recently left the AC (they are usually already in the Individual Ready Reserve) and current reservists (Prior Service or Non-Prior Service). Note, however, that many of those leaving the AC already affiliate with the RC.

Allowing current reservists to sign Intensive Reserve contracts will break their current reserve units; i.e., those units will no longer have a full complement of deployable soldiers. Furthermore, if we have to pay them regular reserve drilling pay after they return from Intensive Reserve duty but they cannot be remobilized for another five years, then the cost computations need to be redone and there are fewer dollars available for bonuses. Whether individuals who volunteered for such Intensive Reserve units would be recallable with their own unit is only an issue in the unlikely case that they were actually mobilized.

Otherwise, those who volunteered for an Intensive Reserve unit can simply return to drilling status, to be called up with their unit.

Option B: Extended Reserves

Responding to concerns that long mobilizations were inconsistent with the civilian roles of reservists, in early 2007, Secretary Gates limited reserve mobilizations to 12 months—much shorter than the 15- to 18-month mobilizations earlier in GWOT. An analysis similar to that in the preceding chapter (and Appendix A) suggests that this change substantially increased the cost of the reserves.

It seems likely that some reservists would be willing to serve more than one year in six. One option would be for some reservists to sign up for the old 12 months deployed (i.e., 15 to 18 months mobilized) implicit contract. An alternative would be for DoD to offer returning reservists the option of returning to active duty after a short break (a few months) or on the AC model of a gap of a year or two.

Such *Extended Reserves* seem quite attractive for DoD. For the current conflict, DoD does not have enough forces, leading to a rotation practice much more intensive than the rotation guidance. Anyone who takes up this offer provides a pure benefit, allowing for more units BoG or longer times between deployments. In the longer term, knowing that some service members would take such an offer might allow maintaining fewer RC (or perhaps AC) units.

Furthermore, DoD's cost savings from sending reservists back sooner than every six (or five) years are so large that very large bonuses could be paid. The size of the bonus can be computed using methods similar to those in Appendix A. To see the argument, consider the current deployment policy (AC one year in three; RC one year in six). Then, a reservist who agreed to deploy twice in a six-year period would be BoG as much as an AC service member. Rather than pay this reservist part-time pay in the other four years, DoD could pay her as much as full-AC pay in the four years not serving and still break even. A bonus of a full year of basic pay (which is well below total compensation) would clearly be cost-effective.

One disadvantage of this approach is that it is inconsistent with calling up the RC as units. Only some reservists would sign up for such an Extended Reserve. In most local areas, there would not be enough reservists to fill a full unit. Taking volunteers would break existing units. Similarly, any bonuses to reservists who had just deployed would have to include the condition that these individuals could be involuntarily mobilized again if their unit was mobilized again.

Another disadvantage of this approach is huge uncertainty about supply—i.e., how many people would agree to join such an Extended Reserve, either when they enlist in the reserves or after being mobilized once. Present ongoing operations provide an easy way to explore supply. DoD could simply mail bonus offers of various sizes to reservists who have been mobilized once. Given the current severe supply problems, anyone who accepts the bonus would be a pure benefit. In addition, acceptance rates would provide a rough measure of the additional supply that an Extended Reserve might provide. With an estimate of the likely supply in hand, DoD could cut force structure while maintaining the capability to indefinitely field a stabilization force of a given size.

Option C: Cadre/New Forces

When the reserves are used with rotation, some reserve forces are not used until six years after the beginning of a conflict. This is more than enough time to recruit and train new forces. As a result, it might be cheaper to create new forces when they are needed rather than paying AC and RC forces when they are not needed, against the possibility that they might be needed.

Thus, rather than maintain forces in the reserves, for some *cadre* units, DoD might maintain only the leaders in the reserves, plus an ability to rapidly recruit and train up new BCTs.[7] With this capability,

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[7] Given its place in the 1992 Base Force, surprisingly little appears to have been written about the personnel aspects of "cadre," or reconstitution. Our limited search has not located any substantial written doctrine on cadre. We have been unable to identify any personnel allocated toward cadre units (or even toward planning for cadre units).

RC forces would not need to be able to indefinitely sustain a stability operation. Instead, there would only need to be enough AC and RC units to fill the gap until new forces become available.

Our very rough analysis suggests that this might allow cutting in half the number of reserve BCTs needed for stability operations,[8] providing substantial cost savings. These potential cost savings proceed from the following timeline. A major combat operation occurs in year 1. By the end of year 1, it becomes clear that a stabilization force will be required, and a temporary increase in the size of the force is authorized. During year 2, accessions are increased to provide new soldiers; promotions and retention are increased to provide new junior leadership. During year 3, new recruits and new promotions receive basic and advanced training. During year 4, the newly formed BCTs receive collective (i.e., not individual, but company, battalion, and then brigade-level) training. Thus, these new forces might be available for deployment in year 5 and following.[9]

Now, consider demand, without cadre. Suppose that two units were continuously needed for stability and that, for operational reasons, at least one of them needed to be an AC unit. Then Figure 6.1 depicts a notional rotation scheme. The year 1 major combat operation and the stabilization that follows are performed by AC forces. Years 2

The best of the existing materials appear to be Brinkerhoff (1991) and a more recent RAND study (Dewar et al., 2000). There is a moderate-sized literature on reconstituting the defense industrial base (as shown in the citations in Dewar et al., 2000).

[8] Cadre has other issues. Such an approach would require DoD to maintain the infrastructure to rapidly recruit and train up new units and the senior leadership to lead them. It would also require (1) the "will" to recognize promptly the likelihood of a long stability operation; (2) the authority to authorize the larger forces; and (3) the ability to recruit them.

[9] In January 2007, President George W. Bush announced his plan to increase the size of the active Army by six BCTs (65,000 personnel) (Sherman and Roque, 2007; DoD, 2007a, b). Initially, the increase was supposed to occur over five years, ending in 2012. As of late 2007, the increase was planned to be completed by the end of 2011, one year earlier (Cloud, 2007). According to Wood, 2007,

> The extra 65,000 soldiers and 27,000 Marines, due to be added by 2012, will increase time at home for units between deployments . . . Army Gen. Peter J. Schoomaker, Army Chief of Staff, and Marine Gen. James T. Conway, commandant of the Marine Corps, told the Senate Armed Services Committee.

Figure 6.1
Notional Rotation Policy without Cadre

Year	1	2	3	4	5	6	7	8	9
Unit 1	AC–1	AC–3	AC–4	AC–1	AC–3	AC–4	AC–1	AC–3	AC–4
Unit 2	AC–2	RC–1	RC–2	AC–2	RC–3	RC–4	AC–2	RC–1	RC–2

RAND *MG757-6.1*

NOTE: AC = Active Component; RC = Reserve Component.

and 3 of stabilization are performed by a mixture of AC and RC forces (in our example, one AC unit and one RC unit; that ratio is not crucial to the argument). Given a three-year rotation cycle, by the fourth year, the first-year all-AC invasion force can cycle back for stabilization. Without a cadre program, years 5 and 6 must again be a mixture of AC and RC forces, and year 7 is again primarily AC. Finally, in year 8, the initial RC forces can rotate back (with some AC). In all, four "sets" of RC units were needed (years 2, 3, 5, and 6).

Consider alternatively, the same situation but with a cadre program. Figure 6.2 depicts a notional rotation policy. The cadre fills years 5 and 6; again, the preexisting active forces fill year 7. The cadre units are AC units with a three-year cycle; years 8 and 9 can

Figure 6.2
Notional Rotation Policy with Cadre

Year	1	2	3	4	5	6	7	8	9
Unit 1	AC–1	AC–3	AC–4	AC–1	AC–3	AC–4	AC–1	AC–3	AC–4
Unit 2	AC–2	RC–1	RC–2	AC–2	CC–1	CC–2	AC–2	CC–1	CC–2

RAND *MG757-6.2*

NOTE: AC = Active Component; RC = Reserve Component; CC = Cadre Component.

be handled by the cadre (i.e., the cadres who first deployed in years 5 and 6). Thus, rather than requiring four "sets" of reserves, the cadre approach requires only two sets of reserves (i.e., half as many). Furthermore, the RC is not used again in this conflict. It only filled the gap until the cadre units could be created.

Of course, such new forces are only a viable option if the President and Congress are willing to promptly authorize them as needed. The history of American preparations for war raises concern that such decisions would be delayed too long for such new forces to be useful (see Vick et al., 2002).[10] For example, facing German rearmament (under way since 1935), the German invasion of Poland (1939) and France (1940), and the Japanese invasion and occupation of Korea and Manchuria (under way since 1931), the United States did not reinstitute the draft until 1940. At that time, plans were put in motion for a major increase in the size of the Army. Nevertheless, the extension of the draft in August 1941 passed by only one vote; in November 1941, President Franklin D. Roosevelt rejected Army proposals for the next major increase in the size of the Army. Of course, with the Japanese attack on Pearl Harbor and American entry into World War II, this decision was reversed and the Army grew rapidly. Nevertheless, it is noteworthy that even a clear danger, but short of actual attack on the United States, was not enough to induce President Roosevelt to create "new forces."[11]

Chris Ordowich's (2008) dissertation in the Pardee RAND Graduate School explores cadre. He considers the details of raising such a cadre force and the potential cost savings. That analysis suggests that the idea has real promise, but some issues need to be worked out. In particular: Can the nation recruit enough people when it needs them? Senior noncommissioned officers and officers cannot be "grown" in a year or two. Where will those leaders come from? What will they do before the new units are created? And what can be done to encourage the creation of cadre units soon enough? The dissertation has initial approaches to these issues, but they need more study.

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[10] See Betts, 1995 (p. 83 and fn 50), for a similar observation.

[11] See Watson, 1950 (esp. pp. 212–240, 363–366) on the extension of the draft and Roosevelt's refusal to continue increasing the size of the Army on the eve of Pearl Harbor.

Heterogeneity and Unconventional Reserves

Each of these unconventional reserves addresses a non-intrinsic limit on using the current reserves. Our discussion suggests that some of these unconventional reserves have the potential to lower costs, increase supply, or both. Clearly, additional cost analysis would be needed before any of these unconventional reserve concepts could be implemented.

Adopting some of these unconventional reserve models would move DoD toward a more heterogeneous model of reserve service. Not every reservist would be willing to sign up for every one of these unconventional reserves.[12] However, for a sufficiently high bonus, some reservists are likely to be willing to sign up for one of these unconventional reserves. Offering multiple reserve contracts recognizes that heterogeneity.

Part of the challenge of unconventional reserves and OASD/RA's "Continuum of Service" concept (which also proposes reserve commitments that diverge from one weekend a month and two continuous weeks (often during the summer) per year [OASD/RA, 2004]) is to design models of reserve service that appeal to different types of potential reservists. Some might be willing to serve, but with less intensity; some might be willing to serve with greater intensity. Doing so is likely to benefit from understanding how different forms of reserve service interact with different types of civilian employment. The conventional (Army) reserve model—one weekend a month and two continuous weeks (often during the summer) per year—is often compatible with conventional American employment patterns (i.e., no work on weekends and summer vacations of several weeks). More-intensive peacetime training is likely to be less compatible with conventional employment patterns. There may be other employment patterns with which it is compatible (e.g., students, summer employment), but those pools are likely to be much smaller.

Adopting these unconventional reserve models would also move DoD toward a more voluntary model of reserve service. Such a volun-

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[12] See Lien et al., 2006, on the heterogeneity of desired reserve service and willingness to serve more time if bonuses were offered.

tary model would arguably be more consistent with the spirit of the AVF. In the extreme, no one would ever be mobilized involuntarily. As it currently does for recruiting, DoD could simply increase a bonus for (a particular pattern of) mobilization until enough volunteers were forthcoming. Given the team nature of many military tasks (e.g., team operations and the unpredictable nature of warfare), DoD probably does not want to go to the extreme of no contract. However, explicit contracts describing in more detail the extent of the service obligation (i.e., How often? For how long? Under what level of mobilization?) would be a major step toward a more voluntary approach to reserve service.

CHAPTER SEVEN

How Should Reservists Be Compensated?

The previous discussion implicitly assumed that current compensation is sufficient to recruit and retain *any* reserve force, regardless of its size or utilization. However, the shift from a Strategic Reserve to an operational force and actual mobilization of the reserves in support of GWOT have fundamentally changed the de facto terms of reserve service. It would not be surprising, therefore, if current compensation—the structure of which is broadly similar to pre-GWOT compensation—were no longer appropriate. Specifically, we need to know: Is the level of compensation sufficient to induce enough people to enlist and reenlist in the reserves? And, is the balance of that compensation—between payments regardless of mobilization and payments when mobilized—appropriate, given the operational force's doctrinal shift to more-intensive use of the reserves?

A formal economic model is useful for thinking about the issues in structuring such changes to compensation. Appendix B develops a theoretical economic model in the spirit of Jim Hosek's analysis of the implications of deployment on retention and compensation.[1] The model developed here suggests that recruiting and retaining reservists for the current and evolving future reserves could be challenging. Furthermore, the model suggests that it is worth considering breaking the currently tight link between active pay and reserve pay.

[1] Hosek and Totten, 2002.

The Basic Model

The implications of the model follow from the simple observation that reserve service has two modes—peacetime drilling (e.g., one weekend a month and two continuous weeks [often during the summer] per year) and mobilization/deployment. While drilling, a reservist receives double pay for one weekend a month (i.e., two days' pay for every weekend day drilling[2]) and basic pay for two weeks during the year (in both cases, basic pay only, no Basic Allowance for Housing [BAH], no Basic Allowance for Subsistence [BAS], and minimal health benefits). If and when called to active duty, a reservist receives (nearly) the full active-duty pay package[3] (full-time basic pay, BAH, BAS, full health benefits for self and family, a retirement contribution, and most other special pays).

To understand how a potential reservist would evaluate reserve duty, it is useful to think about two separate *reservation wages*. The first reservation wage corresponds to drilling. It is the answer to the question: How much would you have to pay me to enter the reserves only for drilling (with no chance of mobilization)? The second reservation wage corresponds to mobilization. It is the answer to the question: How much would you have to pay me to get me to volunteer to be mobilized?

The model's results are sensitive to the assumption that the utility of being a full-time soldier does not vary with whether there is a war or whether one actually deploys. The model implicitly assumes away the possibility of additional utility/disutility of deployment, perhaps in the context of a national emergency (beyond any utility/disutility of mobilization itself). See Hosek and Totten (2002), who find that forces appear to prefer mobilization; in other words, reenlistment rates rise for recently mobilized forces (at least through some moderate level of mobilization). With that alternative assumption, the model no longer

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[2] This "double pay" is often justified as compensation for travel to and from the location of the drill.

[3] Reserve retirement is much less generous than active retirement, and actuarial accruals are smaller (17 percent versus 30 percent).

has clear implications. The alternative assumption appears to be at least partially valid. Given this maintained assumption that there is not additional utility or disutility from active duty combined with deployment or combat, this model appears to provide useful insights.

Of course, reservists do not make the two choices—whether to drill and whether to volunteer to be mobilized—separately. Instead, reserve duty is a *tied sale*: A reservist signs up for both drilling *and* the chance of mobilization, where DoD chooses whom to mobilize when. If the probability of mobilization was small (as it appeared to be before 1991, and even before 2001), then a rational reservist would primarily consider pay for drilling. As long as pay for drilling was above his drilling reservation wage, he would enlist in the reserves, even if pay for mobilization was below the mobilization reservation wage. As long as the probability of mobilization was (very) low, he did not need to consider that wage (much) in his reserve affiliation decision.

The model is constructed specifically to understand the likely effect of a *change* in the probability of mobilization, such as what has clearly occurred since 2001. What does the model imply would happen as the probability of mobilization increases? As the probability of mobilization rises, reservists must increasingly consider whether the mobilization reservation wage is above actual pay when mobilized (i.e., to what extent would he be "underpaid" for mobilization?).

Consider the case when reservists are "overpaid" for drilling (i.e., drilling pay is higher than the drilling reservation wage) but "underpaid" for mobilization (i.e., pay when mobilized is lower than the mobilization reservation wage; they would not volunteer for active duty). In that case, as the probability of mobilization rises, reserve affiliation—and its risk of mobilization—becomes less attractive and a fall in reserve recruiting and retention should be expected.

Are reservists actually underpaid for mobilization? Two pieces of evidence suggest not. First, Loughran, Klerman, and Martin (2006) find that when reservists are mobilized for GWOT (and, in particular, for duty in Southwest Asia), their earnings increase sharply (by roughly one-third, and more as the length of the deployment increases). However, this evidence is not conclusive for the question here. Even though cash earnings rise, such earnings may not rise enough to compensate

for the disutility of mobilization—the discomfort of conditions when deployed, separation from family, danger, uncompensated expenses related to deployment, and earnings loss on return from active duty.

Second, soldiers are willing to deploy and seem to be reenlisting at very high rates.[4] Nevertheless, this also may not be conclusive. Reservists differ from AC forces in particular ways that make this evidence less conclusive.

Alternatively, three different pieces of evidence support the conjecture that reservists are underpaid for mobilization. First, if DoD were paying enough for mobilization, *true volunteers* (i.e., those who volunteer to serve on active duty without being required to do so) would be expected. The evidence on volunteers is not clear-cut, but most of the evidence appears to suggest that while there have been some true volunteers, current levels of mobilization have clearly required truly mandatory call-ups (not merely "volunteers for mandatory call-up" to address concerns of spouses and employers).[5]

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[4] CBO, 2006.

[5] Exactly how much of the current mobilization is involuntary is unclear. Often, DoD simply mobilizes whole units involuntarily. Some of the reservists thereby mobilized involuntarily would have volunteered to be mobilized.

However, the presumption in DoD is that involuntary mobilization was needed. Attempts to get volunteers for second tours have yielded some, but (apparently) not many, reservists. This lack of volunteers for second tours is inducing considerable concern about the ability of DoD to staff future GWOT rotations (Jaffe, 2006). Clearly, second tours are different from first tours, so this evidence is not definitive.

There was an attempt to staff some of the earlier smaller mobilizations (e.g., those during the late 1990s) using volunteers. Even though those mobilizations were much smaller, they appear to have had trouble filling the requirement with volunteers (Thie et al., 2004). Similarly, Grissmer, Buddin, and Kirby, 1989 (pp. 103–112), present pre-ODS/ODS evidence that increased peacetime training for National Training Center (NTC) rotations decreased retention. Furthermore, they present survey evidence that suggests that reservists would be less likely to reenlist if the peacetime training obligation rose. Again, this evidence is not definitive. Perhaps, many more people are willing to volunteer in times of national emergency (e.g., GWOT) than for training or small peacekeeping operations. Hosek and Totten's 2002 work on deployment and reenlistment in the active-duty forces is consistent with such an effect.

Similarly, in response to the suggestion that DoD maintain fewer reserve forces and recruit more forces in wartime, some react by claiming that no one would join at that time. They, therefore, argue that DoD needs to get people to sign a reserve contract during peace-

Second, recent experience appears to be consistent with the model. The model predicts that if reservists are underpaid for mobilization, then as the probability of mobilization increases (and holding the level of compensation fixed), reserve supply will fall. In fact, reserve recruiting is down sharply, despite higher bonuses and lower goals. Reserve retention is down a little, again despite higher bonuses and lower goals.[6]

Third, for the *marginal reservist* (i.e., the one exactly indifferent between enlisting in the reserves and not enlisting at all), underpayment when mobilized is an implication of the model. The model posits that the reserve enlistment choice is really a three-way choice: (1) AC forces, (2) RC forces, and (3) civilian. Most people with high taste (low distaste) for mobilization would have joined the AC forces.[7] Thus, inasmuch as policy ties reserve compensation when mobilized to the active-duty compensation table, it seems likely that reservists will be "underpaid" when mobilized.

It can be inferred that, currently, DoD induces the marginal person to enlist in the reserves despite the fact that he/she would be

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time. This statement is equivalent to an argument that pay while mobilized is not compensating. If pay while mobilized was compensating, people would be willing to join even (perhaps especially) during wartime, because the pay then was so much higher (i.e., high enough to compensate for the disutility of active duty [in wartime]).

[6] GAO, 2005; Dolfini-Reed et al., 2005.

[7] Note also that the model ignores investments and transition costs. A more complete model would note that, once someone decides not to join/stay in the active-duty forces, he/she builds a life (i.e., makes investments) as a civilian. Mobilization rips him/her away from that life, presumably at higher cost than for active-duty persons, who plan their life around mobilization and deployment.

The extreme case is a small businessman (e.g., a plumber). He might be nearly indifferent between staying in the actives and leaving the reserves. However, once he leaves, he builds a civilian client base. Mobilizing him will force his civilian clients to find a new service provider. When he returns to civilian life, he is likely to need to rebuild his client base. (Note that the Uniformed Services Employment and Reemployment Rights Act [USERRA] will not help such a small-business person. USERRA places obligations on employers. Small business owners are their own employers.

This small-businessman example is extreme, but all reservists face similar costs. An active-duty soldier who is deployed has a sympathetic predeployment employer in DoD. The same is not true of the reservist.

underpaid if mobilized *by overpaying him/her when not mobilized* (e.g., large education benefits). This is the case for which raising the probability of mobilization will lead to a decrease in reserve supply. Thus, the model suggests that to staff the new operational force, DoD will need to raise reserve compensation (and by more than any increase in active-duty compensation).

Effects of Underpayment for Mobilization

The previous section suggested that pay to mobilized reservists might be less than the reservation wage for mobilization. If correct, such underpayment is problematic for three reasons. First, in the presence of underpayment, DoD needs to adjust total compensation whenever the probability of mobilization changes. The doctrinal shift to an operational force has clearly increased the long-term probability of mobilization. Thus, some increase in compensation is needed.

Note also that this increase in compensation will increase the relative cost of the reserves. Consequently, it will shrink the cost motivation for maintaining RC forces. The importance of this effect will vary with the magnitude of the required increase in compensation. Unfortunately, little is known about the key relationship: the supply curve for RC forces.

However, there is also a short-term policy issue. Even if policy remains unchanged, high utilization of the reserves in any given year is likely to be followed by high utilization of the reserves in the next year.[8] People will be less likely to join and stay in the reserves when there is a war currently under way.

Conversely, as wars become less likely, pay should be cut. The less underpayment for mobilization, the less severe will be the required cuts in pay with variation in the probability of mobilization. Given that cutting pay is politically difficult, a policy that minimizes the indicated cut in reserve compensation is good.

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[8] Stability operations last several years. If the nation is in a stability operation that uses reserves this year, it probably will be in one next year as well.

Second, underpayment for mobilization increases DoD costs (averaging over years with and without mobilization). The economic theory of *insurance* (i.e., when risk-averse individuals are willing to pay more than the actuarially fair cost to guard against bad outcomes) suggests that people will accept smaller average pay the smaller the average underpayment for mobilization is.[9] Put less formally, when reservists are underpaid for mobilization, they need to make their enlistment and reenlistment decisions based on a guess about the likelihood of mobilization. In the extreme, a reservist might choose not to enlist/reenlist because he perceives that he could not cover his bills if he was mobilized. This concern could be allayed by DoD paying less when drilling and more when and if mobilized (such that total supply is unchanged). Averaging over periods with and without mobilization, this analysis suggests that DoD's costs would be lower.

Third, inasmuch as policymakers consider costs, underpayment for mobilization induces planners—at least at the margin—to overuse the reserves. Such decisions include whether to go to war at all; how much risk to assume (by not sending enough forces) when doing so; how large to make the actives; how large to make the reserves; when to use civilian DoD employees or contractors[10]; when to use new forces; how intensively (i.e., rotation periods) to use the actives; and how intensively to use the reserves.

When policymakers use current costs, they do not perceive the additional compensation costs from the upward-sloping supply curve (i.e., that pay while mobilized will need to increase as the probability of mobilization increases). This failure would cause them to overuse the reserves, relative to the use they would make if they faced the true cost, including the additional cost of raising the fraction of time mobilized.

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[9] This result is not true in the model as stated in Appendix B. That model has linear utility. There is, therefore, no reason to buy insurance.

As in the classical economic theory of insurance, this result will require concavity of the utility functions. It will apply in a generalization of the model in Appendix B when the utility functions have such concavity.

[10] Such cost considerations may, in part, explain President Bush's May 15, 2006, proposal to use reservists to augment the Border Patrol.

This line of argument suggests that DoD would make better decisions if pay while mobilized was closer to the reservation wage.

The next section considers how DoD might restructure reserve compensation to lower the underpayment for mobilization.

Implications of the Model for Policy

With the transition from a Strategic Reserve to an operational force, DoD reserve compensation policy thus faces twin challenges. First, assuming that the probability of mobilization has risen, total reserve compensation probably needs to rise to maintain reserve supply. In the short-term, reserve bonuses have clearly risen. Second, with mobilization likely to be more common, DoD needs to consider whether it wants to shrink the magnitude of the underpayment for mobilization (i.e., to increase total compensation by increasing mobilization-specific pay [rather than increasing drill pay or bonuses unconditional on mobilization]).

To emphasize the fundamental issues about reserve compensation, it is useful to view reserve compensation as having three distinct components, which the model terms *drill pay*, *common pay*, and *mobilization pay*:

- *Drill Pay*: *Drill pay* is a generic term for payments to reservists when not mobilized (i.e., when drilling). Thus, conventional double pay for Inactive Duty for Training (IADT; one weekend a month) is a form of drill pay. Basic pay and BAS for Active Duty for Training (ADT; two continuous weeks per year, usually during the summer) is also a form of drill pay. Health and education benefits (unconditional on mobilization) are a form of drill pay. Finally, enlistment and reenlistment bonuses are also a form of drill pay. Note that increasing bonuses (a form of drill pay) is the conventional DoD response to reserve supply concerns.
- *Common Pay*: *Common pay* is a generic term for payments made both to AC forces and to mobilized RC forces (thus, *common*). Currently, when mobilized, RC forces are paid (nearly as much)

as are AC forces. Thus, any increase in the common pay table—conventional special pays (Family Separation Allowance [FSA], Hostile Fire Pay [HFP], Combat Zone Tax Exclusion [CZTE]) or benefits (e.g., health or retirement)—will increase reserve compensation.

- *Mobilization Pay*: *Mobilization pay* is a generic term for payments (above and beyond common pay) made only to the RC forces and only when they are mobilized. Such mobilization pay would include any pays and allowances that are both reserve-specific and mobilization-specific. The most straightforward approach to mobilization pay would be an additional mobilization payment for reservists, above and beyond the pays and allowances to AC forces. Recent initiatives to provide enhanced education and health benefits the longer a reservist is on active duty can be viewed as mobilization pay. (See the next section for more detail.) Note also that accession and retention bonuses to AC forces can be viewed as negative mobilization pay. They are compensation received by active forces that are not received by RC forces even when they are mobilized.

As DoD reviews and refines reserve compensation to support the new operational force, it might consider changing the level (up or down) of each of these three types of pay. Changes to each type of pay are not equivalent, in that they have different likely outcomes, as described below.

Indeed, given the dual concerns—about the level of reserve compensation (vis-à-vis reserve supply) and the balance of reserve compensation (between payments regardless of mobilization and payments when mobilized), how should the three possible types of changes to reserve compensation be evaluated? The following are possibilities:

- Option (i)—increasing drill pay—will likely increase reserve supply, partially at the expense of active supply. Note, however, that this option will exacerbate the problem of overpayment for drilling and underpayment for mobilization.

- Option (ii)—increasing common pay—may not work. For some current reservists, doing so may make the actives more attractive than the reserves; for some current civilians, it may make the reserves more attractive. In net, raising common pay may decrease reserve supply.
- Option (iii)—increasing mobilization pay for reserves—is likely to increase the reserve supply and shrink the underpayment for mobilization. However, doing so will partly increase the reserve supply at the expense of the active supply. Some people who previously would have joined the actives will now instead choose to join the reserves.

In view of the dual concern, option (iii) seems worthy of additional consideration. This option is likely to raise the reserve supply partially at the expense of the active supply. As a result, to maintain the active supply, it will probably be necessary to simultaneously raise common pay (i.e., option [ii]).

Approaches to Increasing Pay for Reservists While Mobilized

The most straightforward way to increase compensation for reservists (without increasing the pay for AC forces) is to establish a special pay for mobilized reservists, above and beyond the regular pay table. However, there is a norm about "equal pay for equal work" that appears to make doing so difficult.[11]

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[11] See the comments of Secretary James Hall on February 10, 2006:

> When you are in the foxhole and that bullet is coming, it doesn't know whether you are a guardsman, a reservist or active duty, and you're expected to undergo the same kind of danger. And, therefore, we ought to make the benefits the very same. Also, efforts will be made to upgrade benefits available to activated Guard and Reserve members to mirror those provided to the active-duty military."

Note that these comments are about not underpaying the reserves relative to the actives. Our analysis suggests that, because they are citizen-soldiers, when activated, reservists should be paid *more* than their AC counterparts.

Despite this norm, several strategies for increasing compensation for mobilized reservists (i.e., compensation that rises with time on active duty) relative to pay for AC forces seem possible. Some of these strategies are already part of OASD/RA's initiatives:

1. OASD/RA has created a new Reserve Educational Assistance Program (REAP), which provides additional educational benefits with additional time on active duty.
2. OASD/RA has created a new health plan, TRICARE Reserve Select, which provides longer government-paid health insurance as time on active duty increases.
3. The 2000 Military Appropriations Act included a special pay for forces deployed for more than 400 days in a 740-day period. The details of that program were changed in 2004 legislation, and the actual payment of the special pay was waived for the current contingencies. Nevertheless, this special pay provides a precedent. An analogous approach would be to create a special pay for reservists with long periods of mobilization (e.g., more than six months in a year or more than 12 months in six years).
4. DoD currently provides four days of pay for every day of two days of weekend drilling. This higher payment in part covers travel time. It nevertheless provides a precedent for paying training differently. Most long mobilizations will require considerable post-mobilization training, and that training will be conducted separately from AC forces. DoD could, therefore, achieve the goal of higher pay to mobilized reservists by paying for two days of active duty for every day of post-mobilization training or by providing a (large) bonus for participation in the post-mobilization training.

These precedents suggest that it should be possible to increase total compensation to mobilized reservists while nominally paying them from the same basic pay table (and BAH, BAS, and special pays) as AC forces. Whether this would satisfy the equity objections that are likely to arise is unclear.

CHAPTER EIGHT

Closing Thoughts

The nation faces a new security reality—stability operations. Given available forces, force concepts, and compensation, DoD has reacted by making unprecedented use of the reserves. Over the intermediate term, DoD should respond to this new security reality by rethinking available forces, force concepts, and compensation. OASD/RA's Continuum of Service concept begins that rethinking. This monograph has suggested some other issues and concepts for consideration. Each of these concepts has many assumptions and unknowns. Further study would help to flesh out these concepts.

APPENDIX A

Details of Relative-Cost Computations and Sensitivity Analyses

This appendix provides some detail to support the discussion in Chapter Five of the relative cost of the reserves. The discussion here proceeds in three parts. First, we consider the cost of an RC unit relative to that of an AC unit. Second, we consider the relative number of RC units and AC units required to provide one unit Boots on the Ground (BoG). Finally, we put these two ideas together to compute rough RC-relative-to-AC costs per unit BoG. The discussion here is deliberately exploratory. A more complete discussion would require a much more thorough analysis.

Relative Cost per Unit

The discussion below proceeds in terms of the cost of the RC relative to the cost of the AC. A too-simple example helps to explain our basic approach. Suppose that the only cost per unit was basic pay. In peacetime, AC units receive full pay: 12 months at 30 days per month. In wartime, both AC and RC units also receive full pay. Nominally, RC units train one weekend a month and two continuous weeks (often during the summer) per year. This is about 18 percent of full-time pay.[1]

[1] 63 days = 12 months × 2 days per month × double pay for each IADT day + 15 days during the summer; 18 percent = 59 days/360 days.

Of course, this basic pay "model" is very rough. Not all reservists attend every weekend drill or yearly training. Some reservists are paid for more than one weekend a month and two continuous weeks (often during the summer) per year (e.g., for additional training, for helping with operations).

Basic pay is far from the only cost component. For some cost components, the RC cost is much less than 18 percent of the AC cost. In peacetime, the RC receives only minimal health care, BAS, and BAH. The RC incurs few permanent changes of station (PCS) moves. The RC is ineligible for many noncash services (e.g., Morale Welfare Recreation [MWR], post exchange [PX], subsidized child care).

For some cost components, RC costs are lower than AC costs, but probably greater than 18 percent. The RC trains less intensively in peacetime, so its operation and maintenance costs should be lower than AC costs. RC retirement benefits are less generous than AC retirement benefits, so the per-person retirement costs should be lower.[2]

On the other side, anything that is per service member, rather than per day in uniform, will have RC cost close to AC cost. Thus, we recruit and train individuals (rather than days per year), so we would expect recruiter time per recruit and training (personnel time and instructor time) to be nearly equal (perhaps bonuses can be smaller). When reservists serve long enough to qualify for retiree health care, their costs will be nearly equal to the costs for ACs.

Costs that vary only with the size of the fielded force can be ignored. They will net out of our calculations. For example, whoever deploys—AC or RC—will get Hostile Fire Pay, Family Separation Allowance, and Combat Zone Tax Exclusion. To a first order, those costs will be the same regardless of whether the forces BoG are AC or RC. They can be ignored in these computations.

Finally, we note three important cost contributions whose treatment is less clear. First, consider equipment. If all units fall on equipment in theater (i.e., rather than bringing their equipment from their home station, they use equipment already in theater—often equipment left by the previous or earlier units), then the only equipment costs

[2] DoD, Office of the Actuary, 2005.

will be for training sets. The number of training sets needed should be approximately for an AC unit compared with for an RC unit and should vary approximately with training time of the two types of units.

Note, however, that this approach implicitly assumes that RC (and probably also AC) units will not have full equipment sets. Otherwise, we would need to consider the cost of equipment per unit (not per unit deploying at a point in time). Buying equipment per individual would raise the relative cost of the RC. To the extent that each service member needs equipment (certainly uniforms; probably personal weapons, communications gear, night-vision equipment; perhaps larger equipment, such as vehicles), those costs are per service member.

The more equipment an RC unit gets, the higher its relative cost. This is clearly true if the baseline is full equipment for the AC and we increase RC equipment from nothing, toward AC levels. This will also be true if we consider raising equipment levels in both the AC and RC. The basic pay–only example ignores equipment. Everyone falls on training sets, and since the RC gets more than one-sixth the equipment of the AC, the relative cost will rise above our pure basic pay example (18 percent above).

How big would the effect on costs be? Very, very roughly, one-time costs for an equipment set for light units are about the same as annual personnel costs.[3] Assuming a 20-year life for equipment (in

[3] Open information on equipment costs is limited. The assumption that one-time equipment costs are roughly equal to *annual personnel costs* (e.g., pay, bonuses, allowances) is consistent with two data points. For light infantry units, Palmer et al., 1992 (see p. 23, Table 3.1, and p. 25, Figures 3.3 and 3.4), estimate one-time equipment costs at about the annual manpower costs. CBO, 2006, estimates the cost of the recent (mostly light) expansion of the Army at $9.3 billion in annual personnel costs and $12 billion in one-time equipment costs.

These estimates appear to be for the High Mobility Multipurpose Wheeled Vehicle (HMMWV)/pre–Mine Resistant Ambush Protected (MRAP) era. Facing improvised explosive device (IED) threats, even light units now have considerable and expensive vehicles.

Equivalent computations for heavy units are much, much higher. Palmer et al.'s 2002 estimates for heavy units are much higher—five times annual personnel costs. More recent RAND estimates (e.g., Hix, Polich, and Lippiatt, 2003) suggest that the cost of equipment has risen sharply, especially for heavy units.

peacetime),[4] giving a full equipment set to the reserves would raise costs from 18 percent to 22 percent.[5] Full equipment sets seem unlikely, so the appropriate increment is probably only a few percentage points.

The improvised explosive device (IED) threat appears to have sharply increased the vehicle costs of even light (for these purposes, nontank) units. Doubling the cost estimate for equipment takes our estimate from 18 percent to 25 percent,[6] if both the RC and the AC get full equipment sets. If the RC and the AC get more-limited equipment sets for training and fall-on equipment in theater, the costs will be much lower.

Second, consider Veterans Administration health costs. CBO estimates of the costs of the military include a large contribution from Veterans Administration health costs. Inasmuch as these costs are for wounded service members, they would be expected to be approximately constant, regardless of whether a task is assigned to the RC or the AC. Those costs would not enter into our computations. However, inasmuch as these costs are per service member—AC or RC—they will substantially increase the relative cost of the RC.

Third, consider *full-time support* (FTS)—i.e., full-time reservists. FTS involves performing tasks at *above unit* (e.g., management functions that in the AC are performed by individuals outside a unit). The RC is about 10 percent FTS. Our concept of interest is the cost per unit. Because such functions are performed by individuals outside a unit, FTS need not enter into our computations. (Implicitly, we are assuming that costs above the unit are about the same in the RC and the AC.) However, inasmuch as FTS involves performing roles inside the unit (e.g., planning training, managing supplies and weapons), these are costs that should be charged to the unit. Doing so would

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[4] CBO, 2005b (p. 85), uses a planning factor of 20 years for wheeled vehicles and 30 years for tracked vehicles.

Equipment wears out (i.e., needs to be refurbished or replaced) much faster when used in operations. Again, such incremental costs do not enter into our calculations. They are a function of the number of units used in operations (and how they are used). They will not vary with whether those units are AC or RC.

[5] The exact computation is (18 percent + 5 percent)/(100 percent + 5 percent).

[6] The exact computation is (18 percent + 10 percent)/(100 percent + 10 percent).

substantially increase the cost of an RC unit. To see this, return to our basic pay–only example. If all FTS was assigned to a unit, relative cost would rise from about 18 percent to about 26 percent.[7]

In summary, the basic pay–only analysis suggests a relative cost of about one-sixth (perhaps 18 percent). Some other cost components imply a relative cost above this level; other cost components imply a relative cost below this level.

The literature from the 1990s seems to suggest that the appropriate cost is above that of this simple basic pay–only analysis. CBO (1990, p. 31, Table A-1, "European Heavy Division vs. CONUS Heavy Division [ARNG]") estimated 20 percent. RAND (Palmer et al., 1992, p. 34) estimated 23 to 25 percent for Army light and heavy divisions. They note that official Army models imply lower ratios—16 to 19 percent. They then discuss why the official Army estimates are not appropriate for their purposes. The *Total Force Policy Report to the Congress* (DoD, 1990) estimated combat at 26 percent and support at 25 percent.[8] CBO (2005b, p. 74) estimated 30 percent ($2.5 million/$8.3 million) for logistical support.

Most of these estimates are now a decade and a half old. They were developed to help understand post–Cold War force-structure choices—but still assuming Total War, fought with heavy units and without rotation. Clearly, more-current estimates focused on light units for stability operations are needed. Efforts to provide such estimates are under way as part of this project.

For the quantitative analysis in the balance of this appendix, we use the range of estimates implied by the earlier literature. As a sensitivity analysis, we consider the range of estimates 20 percent (CBO, 1990) to 30 percent (CBO, 2005b). For our base case, we use the midpoint of that range—25 percent. That estimate is close to Palmer et al. (1992).

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[7] The computation is as follows: 26 percent = 90 percent part-time reservists at 18 percent + 10 percent FTS at 100 percent. Even assigning half of the FTS to a unit would raise costs to 22 percent (= 95 percent × 18 percent + 5 percent × 100 percent).

[8] DoD, 1990 (p. 41, Table 5).

Number of Units in Force per Unit BoG

We argued in Chapter Five that, for cost computations, the crucial issue is rotation policy and, specifically, units in the force to supply one unit BoG. Here, we provide the underlying analysis. The basic idea is simple. The units required in the force can be computed as the ratio of total cycle length to BoG per cycle, or

$$\text{Units Required} = \frac{\text{Cycle Length}}{\text{BoG per Cycle}}.$$

To apply this formula to the AC, note that the stated goal is that the AC should be in theater one year in three—i.e., cycle length is 36 months and BoG per cycle is 12 months. Thus, according to the policy guidance, we need 3.0 (= 36/12) AC units in the force to keep one unit BoG.

To apply this formula to the RC, note that the stated policy goal is one year mobilized in every six years.[9] However, this year must include post-mobilization training. Assuming three months of post-mobilization training, we are left with nine months' BoG—i.e., cycle length is 72 months and BoG per cycle is 9 months. Thus, according to the policy guidance, we need 8.0 (= 72/9) units in the force to keep one unit BoG. Thus, the ratio of RC to AC units is slightly less than 3 (~2.7 = 8.0/3.0).

These are the computations at the *rotation guidance*. Recent *rotation practice*[10] is much more intensive than the guidance. For exposition, we characterize recent practice as follows. For the AC, we use

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[9] Note that that one year in six is the goal stated by Secretary of Defense Gates. The U.S. Army Reserve continues to plan using a one-year-in-five goal.

[10] This "recent rotation practice" is "current rotation practice" as of this analysis in late 2007 and early 2008. We use it here to represent the upper limit on utilization—short of Total Mobilization and service in the war zone "for the duration."

On April 10, 2008, the President announced plans to return to 12 months deployed out of 24 (rather than 15 out of 28). Assuming that these plans are implemented, what we here call "recent rotation practice" will no longer be "current rotation practice." For the President's statement, see "Fact Sheet: The Way Forward in Iraq," 2008.

15 months BoG out of 27 (i.e., only 12 months at home). For 15 months BoG out of 27, we require only 1.8 units in the force for one unit BoG (versus 3.0 under the policy guidance). For the RC, we use 9 months BoG out of 60 (i.e., a five-year cycle rather than a six-year cycle). For 9 months BoG out of 60, we require only 6.7 units in the force for one unit BoG (versus 8.0 under the policy guidance). Note, however, that we have "squeezed" the AC more than the RC. The ratio of RC units to AC units has risen from just below 3 to just below 4 (2.7 to 3.7 = 6.7/1.8).

These rotational assumptions require some modification to our cost model. We continue to compute RC costs relative to AC costs. Given our cost concept, AC costs are approximately constant regardless of whether an AC unit actually deploys and the current rotation policy. The situation for RC costs is more complicated. If the RC only drills, its cost is the assumed 25 percent of AC costs every month.

When the RC is used, it gets full pay while mobilized. Thus, under the rotation guidance, the cost of an RC unit is about 38 percent of the cost of an AC unit.[11] At current rotation policy, AC costs continue to be 100 percent. RC costs rise to 41 percent.[12]

These computations are appropriately rough for this monograph. A more complete analysis should consider time for Reinforcement in Place Transfer of Authority (RIPTOA; i.e., the time when two units are needed in theater to cover one task: first, the new unit acclimates while the old unit does the task, then the old unit packs up while the new unit does the task) and extra pay for more intensive training immediately preceding mobilization. Both of these adjustments would raise the relative cost of the RC, but only slightly.

[11] To see this, note that the RC unit receives full-time pay for 13 months (9 months BoG + 3 months training + 1 month accumulated leave) and part-time pay for the other 59 months (38 percent = [100 percent × 13 months + 25 percent × 59 months]/72 months).

[12] 41 percent = (100 percent × 13 months + 25 percent × 47 months)/60 months.

Relative Cost per Unit BoG

With these building blocks, we can generate a rough estimate of the relative cost of the reserves (see Table A.1). The left panel of Table A.1 considers peacetime; the right panel considers wartime. Within each panel, we consider the AC and then the RC. Finally, we compute the ratio—i.e., relative cost per unit BoG.

The first row of Table A.1 simply copies the relative costs from the preceding section: 100 percent in peace and in war for the AC; 25 percent for the RC in peacetime (our base case); and 38 percent for the RC in wartime (our base case with the rotation assumptions).

The second row of Table A.1 simply copies the assumed units required per unit BoG. We specify force structure before we know whether we will be in peace or in war. Thus, we will have the units required for war, even if "peace breaks out" (for the AC, for the RC).

The third row of Table A.1 computes cost per unit BoG as the product of the average cost per month and units required (per unit BoG). The final row of Table A.1 reports the ratio of RC costs per unit BoG to AC costs per unit BoG.

This is the structure of the computations. We now turn to substance. In peacetime, the relative cost per unit BoG (i.e., of having enough units in the force to supply that unit BoG) for the RC is much cheaper: about 67 percent of the AC. In wartime, the RC is

Table A.1
Relative Cost per Unit BoG, in Peace and in War (Case 0)

	Peace		War	
	AC	RC	AC	RC
Cost per month	100%	25%	100%	38%
Units required	3.0	8.0	3.0	8.0
Cost per unit BoG	300%	200%	300%	304%
Relative cost	67%		101%	

slightly more expensive; according to the table, 101 percent. This estimate involves some rounding (38 percent is really 38.5 percent). Below, we use the unrounded estimate of 103 percent—i.e., all of the cost advantage goes away.

Of course, we do not expect to use the RC continuously. If we expect to almost never use the RC, the 67-percent estimate is appropriate. If we expect to almost always use the reserves, the 103-percent estimate is appropriate. This simple computation has an important policy implication. The RC will be more cost-effective the "deeper" the reserve (i.e., the less we expect to use it). Note, however, that recent policy shifts have moved the RC from a Strategic Reserve to an operational force (i.e., toward using it more frequently). For this discussion, one should think of an RC unit as "used" when any of the 8.0 units required to maintain a unit BoG is actually BoG. Thus, prior to GWOT, about 8.0 RC BCTs were used to provide about 1.0 BCT continuously to Bosnia and Sinai. Recently, all RC BCTs are being used.

In the computations that follow, we assume that, under the operational force, the RC will be "used" about half the time. This implies that the appropriate cost is halfway between always used and never used, about 85 percent (= [67% × 50% at peace] + [103% × 50% at war]; recall that we report the unrounded estimates). This is still considerably less than the cost of an AC unit BoG, but not the dramatic 25-percent figure that was appropriate for forces used without rotation.

These results are quite sensitive to assumptions. Table A.2 presents results for some alternative assumptions. We have already derived the estimates in the middle of the row labeled "0: Base Case": RC costs 25 percent of AC; AC deploys 12 months in 36 (written 12:36), RC trains for 3 months and deploys for 9 months out of 72 (including one month of paid leave). The middle column gives the cost of the RC relative to the AC, when the RC is "used" half the time: 85 percent. The left column considers using the RC less, only 25 percent of the time. For that case, the RC's relative cost is lower: 76 percent (= [67% × 75% at peace] + [103% × 25% at war]; recall that we report the unrounded estimates). The right column considers using the RC more: 75 percent of the time. For that case, the RC's relative cost is higher, 94 percent (= [67% × 25% at peace] + [103% × 75% at war]; recall that we report

Table A.2

Sensitivity of Relative-Cost Estimates to Assumptions

	% War		
Case	**25%**	**50%**	**75%**
0: Base Case (AC, 12:36; RC, 9+3:72; Relative Cost, 25%)	76%	**85%**	94%
1: Actual Rotation (AC, 15:27; RC, 12:60) vs. Base Case (AC, 12:36; RC, 9+3:72)	108%	**123%**	138%
2: Alternative Rotation A (AC, 12:24; RC, 9+3:60) vs. Base Case (AC, 12:36; RC, 9+3:72)	97%	**110%**	124%
3: Alternative Rotation B (AC, 12:24; RC 9+3:72) vs. Base Case (AC, 12:36; RC, 9+3:72)	114%	**127%**	141%
4: Pre-1/2007 Rotation (AC, 12:36; RC, 12+3:72) vs. Base Case (RC, 9+3:72)	58%	**67%**	75%
5: Longer RC Train-Up Time (RC, 8+4:72 vs. Base Case, 9+3:72)	85%	**95%**	105%
6: Shorter RC Train-Up Time (RC, 10+2:72 vs. Base Case 9+3:72)	68%	**76%**	84%
7: Lower RC Relative Cost (20% vs. Base Case 25%)	63%	**73%**	82%
8: Higher RC Relative Cost (30% vs. Base Case, 25%)	88%	**97%**	105%

the unrounded estimates). Our discussion below focuses on the middle case (the bolded and shaded column).

The other rows of Table A.2 vary these assumptions. For this table, we characterize recent rotation practice as the AC deployed 15 months out of 27 (i.e., 1.8 AC units per unit BoG) and the RC trained for 3 months and deployed for 9 months out of 60 (i.e., 6.7 RC units per unit BoG). This is more intensive for both the AC and the RC, but the increase relative to the Base Case is more for the AC.

To see how the computations shift, consider the second row of Table A.2 "1: Actual Rotation." The preceding paragraph implies that

the third row changes from 3.0 AC units and 8.0 RC units to 1.8 AC units and 6.7 RC units. The RC cost in wartime also changes (from 39% to 41% = [13 months × 100%] + [47 months × 25%]/60). Cost per unit BoG is again the product of the average cost per unit per month over a cycle and the number of units in the force per unit BoG. The relative cost of the RC in peace and in war is computed as before; Table A.3 shows them to be 93 and 153 percent. The center column of Table A.2 reports half peace/half war as the average of these two numbers: 123 percent.[13] Thus, at current rotation practice, the relative cost of the RC rises from below that of the AC to more than that of the AC (i.e., 85 percent to 123 percent)—i.e., at recent rotation practice, the RC is *more expensive* for stability operations. There is no cost advantage but, instead, a moderate cost *dis*advantage.

Recent AC rotations have been extremely intense: 15 months in theater out of every 27. The next two rows of Table A.2 consider slightly less intense rotations: 12 months in theater out of 24. They differ in the assumed RC rotations. Row 2, Alternative A, maintains the more intense RC rotation (12 months activated out of 60 months), while Row 3, Alternative B, uses a less intense RC rotation (12 months mobilized out of 72 months). Neither of these alternatives brings the

Table A.3
Relative Cost per Unit BoG, in Peace and in War (Case 1)

	Peace		War	
	AC	RC	AC	RC
Cost per month	100%	25%	100%	41%
Units required	1.8	6.7	1.8	6.7
Cost per unit BoG	180%	168%	180%	275%
Relative cost	93%		153%	

[13] These are the rounded computations. The computations in the table are performed in Excel on the unrounded intermediate values. They will sometimes differ slightly from what would be computed using a calculator and the rounded estimates.

RC back to cost parity. When the AC is rotated even 12 months in 24 months, the RC loses its cost advantage.

The next row of Table A.2, "4: Pre-1/2007 Rotation," considers costs if the RC deployed for a year (but still required only 3 months of training). With these assumptions, the relative cost of the RC falls to two-thirds that of the AC (i.e., from 85 percent to 67 percent). With that longer period of mobilization, the RC is again much cheaper than the AC. Recent deployment patterns increase the intensity of the AC much more than they increase that of the RC.

The next pair of rows of Table A.2 varies train-up time. In this usage, *train-up time* includes all months mobilized that are not deployed—that is, any time until the beginning of training, any time from the end of training until actually taking primary responsibility for a task in theater (e.g., travel to the theater, transfer of authority), and any time between relinquishing primary responsibility for a task in theater and demobilization (e.g., transfer of authority, travel from the theater, demobilization activities) but excluding leave, which we have considered explicitly. Our Base Case assumes that train-up time requires three months. Pre-2007 Army practice appears to have been closer to five months. Varying this time from four to three to two months changes the relative cost from 95 percent to 85 percent to 76 percent.

The last two rows of Table A.2 vary the underlying relative cost of the RC in peacetime. Our Base Case assumes that, in peacetime, the RC costs 25 percent of the AC. This estimate is deliberately at the middle of the existing literature. The last two rows consider relative peacetime costs of 20 percent and 30 percent. The corresponding relative costs per unit BOG are 73 for our Base Case of 20 percent, 85 percent for 25 percent, and 97 percent for 30 percent.

In summary, in our Base Case for forces used with rotation, the RC is less expensive than the AC (85 percent). This gap is much smaller than the assumed raw gap (25 percent) that would be appropriate for forces used rarely and without rotation. These results are very sensitive to rotation policy. If deployments last a full 12 months (and mobilizations last 15 months), the RC's cost drops to about two-thirds of the

AC's. At recent rotation experience, the RC is moderately more expensive than the AC (123 percent).

The results are sensitive to the length of training. Through all scenarios we consider, the RC remains cheaper, but not much cheaper, than the AC.

The results are also sensitive to the underlying cost per unit of the reserves. Our Base Case is deliberately in the middle of the range of plausible costs per unit. Estimates in the literature would take the cost per unit BoG to near the cost of the AC (97 percent) or down to three-quarters of the cost of the AC (73 percent).

This discussion should be viewed as only exploratory. Many considerations have been left out. The underlying parameters are reasonable, but far from definitive. With these caveats, we can say that these results clearly suggest that much of the RC's cost advantage disappears when the projected use is with rotation. Plausible alternative assumptions take the cost of the RC to or above the cost of the AC (thus, the statement in the body of the monograph).

APPENDIX B

An Economic Model of Reserve Compensation

This appendix provides a formal derivation of the model of reserve compensation sketched in the body of this monograph. The basic insight of the model is to conceptualize reserve duty as composed of a two-state world:

- *N/Not Mobilized*: When not mobilized, the reservist receives military pay m_N for reserve duty in addition to civilian pay y_C from his/her civilian job (where each of these pays should be thought of as per-day in each state). Here, we conceptualize m_N to include all components of compensation—pay, allowances, and other benefits (e.g., health care, education). In addition, the reservist bears a dollar-valued disutilty of reserve service (possibly negative; that is, all else being equal, he/she prefers being in the reserves unmobilized to being a civilian), τ_N (with taste for civilian life normalized to zero).
- *A/Mobilized*: When mobilized, the reservist receives m_A for reserve duty, but forfeits his/her civilian pay. (There is no *civilian top-off*; i.e., the civilian employer does not make up any difference in pay.) The compensation the reservist receives while on active duty is assumed to be identical to that received by members of the active-duty force. In addition, the reservist bears a dollar-valued disutilty of active-duty service (possibly negative—i.e., all else being equal, he/she prefers being mobilized to being a civilian), τ_A (with taste for time in AC forces set to the same value as taste as a reservist while serving on active duty).

With probability ρ, the reservist is mobilized in any period; with probability $1-\rho$, the reservist is not mobilized in that period. Alternatively, the individual can join the AC forces and receive m_A; i.e., the assumption that, when mobilized, the RC forces are compensated exactly as are the AC forces. Finally, the model is closed, with linear expected utility.

The model is clearly oversimplified. Linear utility is not realistic. Actual military compensation—for the actives and for the reserves—varies with component and the specific deployment (e.g., receipt of FSA [Family Separation Allowance], HFP [Hostile Fire Pay], CZTE [Combat Zone Tax Exclusion]).[1] Bonuses and other considerations imply that compensation received by reservists while on active duty is not identical to compensation received by AC forces. Finally, here we assume that civilian compensation is independent of the probability of mobilization and whether the individual joins the reserves. Each of these restrictions could be relaxed. Below, we discuss relaxing some of them. Nevertheless, this simple framework allows for an apparently insightful graphical analysis. Furthermore, most of the basic results appear to carry over to a more complex model.

Given the assumption of linear utility, a potential recruit will join/stay in the active forces versus remaining a civilian if

$$y_C < m_A - \tau_A \tag{B.1}$$

(ignoring the possibility of joining the reserves). Note that this expression can be rewritten as a vertical line in $\left(\tau_A + y_C\right), \tau_N$ space:

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[1] In terms of the model, it is easiest to view FSA, HFP, and CZTE as approximately *perfectly compensating differentials*; i.e., they exactly compensate soldiers for separation from family, hostile fire, and serving in a combat zone such that if the solider was indifferent between (i) serving at this pay without the benefits not separated from his/her family, not under hostile fire, and (ii) not in a combat zone, he/she would also be indifferent to serving separated from family, under hostile fire, and in a combat zone. With that assumption, active-duty pay (adjusted for the compensating differential) is unchanged by deployment.

The exclusion of these pays from the computation of reserve earnings loss is consistent with this approach. This justification was explicitly made by several congressional staffers.

$$m_A > \tau_A + y_C. \tag{B.2}$$

Similarly, a potential recruit will join/stay in the reserves when

$$y_C < \rho\left(m_A - \tau_A\right) + \left(1-\rho\right)\left(y_C + m_N - \tau_N\right) \tag{B.3}$$

(again, ignoring the possibility of joining the active forces). This expression can also be rewritten as a line in $\left(\tau_A + y_C\right), \tau_N$ space. In this space, the line has a negative slope and a positive intercept with the *y*-axis:

$$\tau_N < + \left\{ \frac{\rho}{1-\rho} m_A + m_N \right\} - \frac{\rho}{1-\rho}\left(\tau_A + y_C\right). \tag{B.4}$$

Note that the slope of this line is only a function of the probability of mobilization, ρ. Increases/decreases in compensation with mobilization, nonmobilization, or both (e.g., bonuses) simply shift the line up/to the right.

Finally, an individual who would enlist in either the AC forces or the RC forces will join the reserves if

$$m_A - \tau_A < \rho\left(m_A - \tau_A\right) + \left(1-\rho\right)\left(y_C + m_N - \tau_N\right) \tag{B.5}$$

or, equivalently, if

$$\tau_N < \left(m_N - m_A\right) + \left(\tau_A + y_C\right) \tag{B.6}$$

i.e., again a line in $\left(\tau_A + y_C\right), \tau_N$ space—this time with a positive slope and a negative intercept with the *y*-axis (as in Figure B.1). Note that the slope of this line is always 1, independent of compensation or the probability of mobilization. Increases/decreases in compensation with

mobilization, nonmobilization, or both (e.g., bonuses) simply shift the line to the left/right.

This is the choice for a given individual. We expect tastes to vary across individuals for the reserve duty, τ_N; active duty, τ_A; and civilian labor market opportunities, y_C. For example, if we subscript by individuals, *i*, Eq. (B.3) becomes

$$\tau_{N,i} < + \left\{ \frac{\rho}{1-\rho} m_A + m_N \right\} - \frac{\rho}{1-\rho} \left(\tau_{A,i} + y_{C,i} \right). \tag{B.7}$$

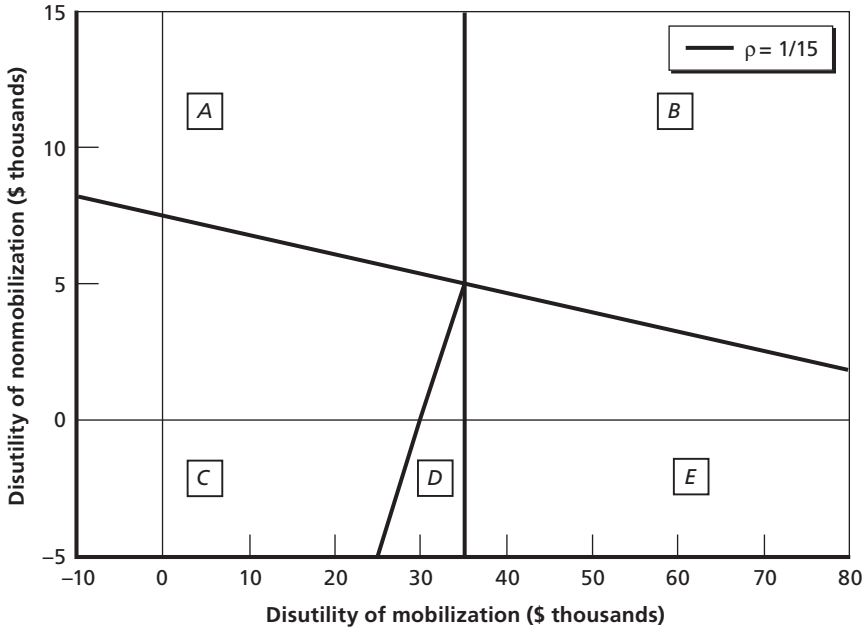
In much of what follows, we suppress the individual heterogeneity and the *i* subscript.

A Graphical Representation

Figure B.1 portrays this choice problem graphically. Each point on Figure B.1 represents a combination of preferences for active and reserve service. Along the horizontal axis, Figure B.1 plots heterogeneity—specifically disutility—with respect to active-duty service: $\left(\tau_{A,i} + y_{C,i} \right)$; along the vertical axis, it plots heterogeneity with respect to reserve duty: $\tau_{N,i}$. By design, this is the space called out in the discussion following Equations B.2, B.4, and B.6. For this space, moving toward the southwest, potential reservists have both lower disutility of active-duty service and lower disutility of nonmobilization while in the reserves.

Figure B.1 considers the case when active-duty compensation and reserve compensation are exactly linked; that is, there are no component-specific pays or bonuses (and noncash benefits are exactly proportional to time on active duty). Specifically, Figure B.1 plots the case in which DoD offers $5,000 per year for nonmobilized reserve

Figure B.1
The Reserve Enlistment/Reenlistment Decision



RAND *MG757-B.1*

duty and $35,000 per year for mobilized reserve compensation, and the probability of being mobilized in any year is one in 15 (about 7 percent). These values for pay are very roughly correct for mid-level enlisted forces deployed to Iraq today. On Figure B.1, this is the point where the three lines meet.

For this model and given this specification, people with preferences in regions D and E choose to join the reserves, people with preferences in regions A and C choose to join the active forces, and people in region B remain civilians.[2] This should be consistent with intuition.

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[2] To this point, this appendix has considered the binary comparisons. The comparisons are in fact three-way. Nevertheless, the analysis in the text is correct. Consider the cases:

Region A: Active is preferred to civilian, which is preferred to reserve, so active.

Region B: Civilian is preferred to reserve, and civilian is preferred to active, so civilian.

Region E: Reserve is preferred to civilian, which is preferred to active, so reserve.

People with very high distaste for both active-duty service and reserve service (i.e., those in the northeast sector, Region B) join neither the actives nor the reserves. People with (relatively) high distaste for active-duty service but low distaste for reserve service (i.e., those in the southeast sector, Region E and, it turns out, Region D) join the reserves. People with (relatively) high distaste for reserve service, but low distaste for active-duty service (i.e., those in the west and northwest sectors, Regions A and C) join the active forces.

The size of each group will depend on the population distribution of disutilities/distastes (including civilian wage offers). Such a distribution of preferences would be represented as a contour chart on Figure B.1. However, because Figure B.1 is busy enough and because we have no information on the shape of those contour lines, we do not draw such lines.

Reserve Compensation as the Probability of Mobilization Increases

Now, consider what happens when the probability of mobilization rises, as it has recently. Figure B.2 plots the case for which the probability of mobilization rises to one in six (approximately 18 percent per year), holding compensation when not mobilized and when mobilized the same as in Figure B.1. Then, the line along which people are indifferent between enlisting and not enlisting in the reserves rotates clockwise around the point at which DoD pays exactly the individual's disutility in each state of the world (including forgone civilian earnings, if mobilized). People in region E1 no longer enlist in the reserves (instead, they remain civilians). If the only choice was between the reserves and civilian life, people in region C1 would now enlist in the reserves (rather than not enlist at all). However, there is also the option of join-

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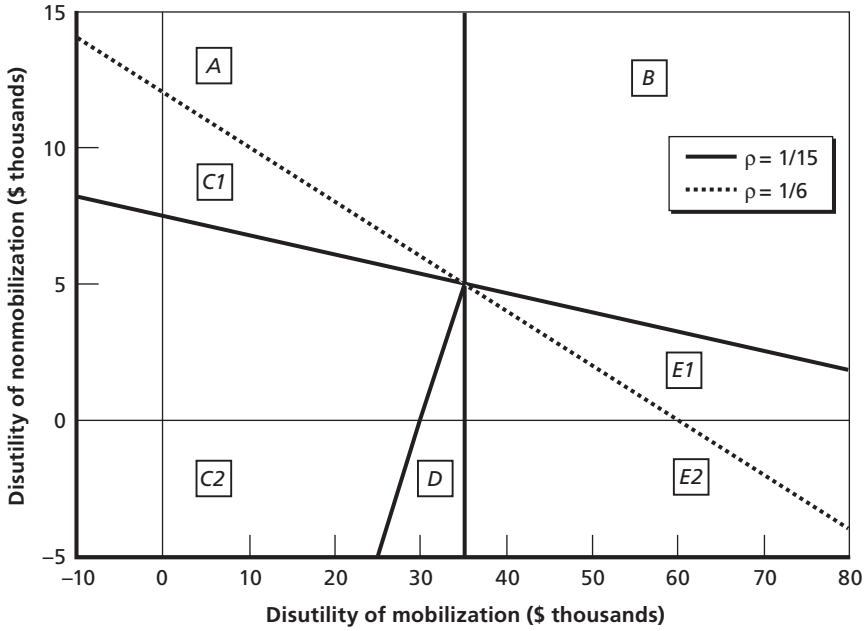
The only complicated case is the southwest corner, where active is preferred to civilian *and* reserve is preferred to civilian. This is the case considered in Equations B.5 and B.6. The labeling of the regions on either side of the line is consistent with what would be expected by a continuity argument, and the extreme cases correspond to the intuition developed in the body of the monograph (but omitted from the appendix).

Figure B.2
Effect on the Reserve Enlistment/Reenlistment Decision of a Change in Probability of Mobilization



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ing the actives. The people in A enlist in the actives no matter what the probability of mobilization.

Three Approaches to Increasing Total Reserve Compensation

The body of the monograph argues that current compensation policy underpays for mobilization. Thus, reserve compensation will need to be increased. In terms of the model, there are three potential ways, or options, to do so.[3]

[3] Note that the Hosek and Totten, 2002, equivalence of pay does not apply in this model. It is not true that any change in pay that raises expected reserve pay has the same effect on reserve supply. The reason is insightful. The Hosek and Totten model has two options (active/

Option (i)—increasing drill pay—is plotted in Figure B.3. Suppose we were to increase drill pay by Δ_N. Then we have three equations for the borders of the regions:

$$\begin{aligned} m_A &< \left(\tau_A + y_C\right) \\ \tau_N &< \left\{\frac{\rho}{1-\rho} m_A + \left[m_N + \Delta_N\right]\right\} - \frac{\rho}{1-\rho}\left(\tau_A + y_C\right) \\ \tau_N &< \left(\left[m_N + \Delta_N\right] - m_A\right) + \left(\tau_A + y_C\right) \end{aligned} \tag{B.8}$$

i.e., the vertical line remains unchanged, but the two diagonal lines shift up by Δ_N.

We argue in the body of the monograph that this option will increase reserve supply, but it will also exacerbate the problem of overpayment for drilling and underpaying for mobilization.

Option (ii)—increasing mobilization pay for the actives *and* for the reserves—is plotted in Figure B.4. Suppose we were to increase drill pay by Δ_A. Then we have the following three equations for the borders of the regions:

$$\begin{aligned} m_A + \Delta_A &> \left(\tau_A + y_C\right) \\ \tau_N &< \left\{\frac{\rho}{1-\rho}\left[m_A + \Delta_A\right] + m_N\right\} - \frac{\rho}{1-\rho}\left(\tau_A + y_C\right) \\ \tau_N &< \left(m_N - \left[m_A + \Delta_A\right]\right) + \left(\tau_A + y_C\right) \end{aligned} \tag{B.9}$$

i.e., the ertical line shifts right by Δ_A, as do the two diagonal lines. On the vertical scale, the positively sloped line shifts up by Δ_A, while

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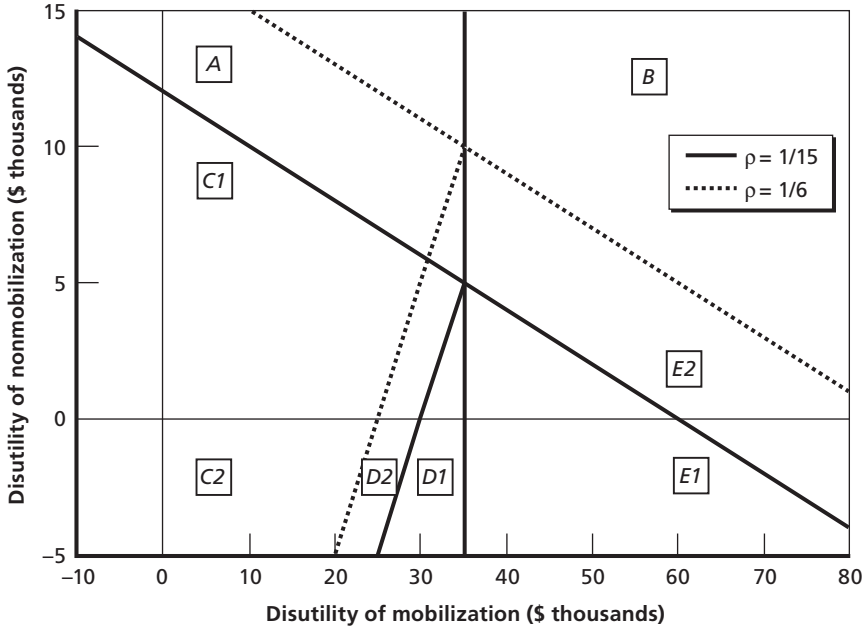
civilian). This model has three options (active/reserve/civilian). Different pay schedules with the same expected reserve income will nevertheless affect that active/reserve choice. This third choice overturns the Hosek-Totten–like equivalence result for this problem.

Figure B.3
Effect on the Reserve Enlistment/Reenlistment Decision of an Increase in Pay for Drilling



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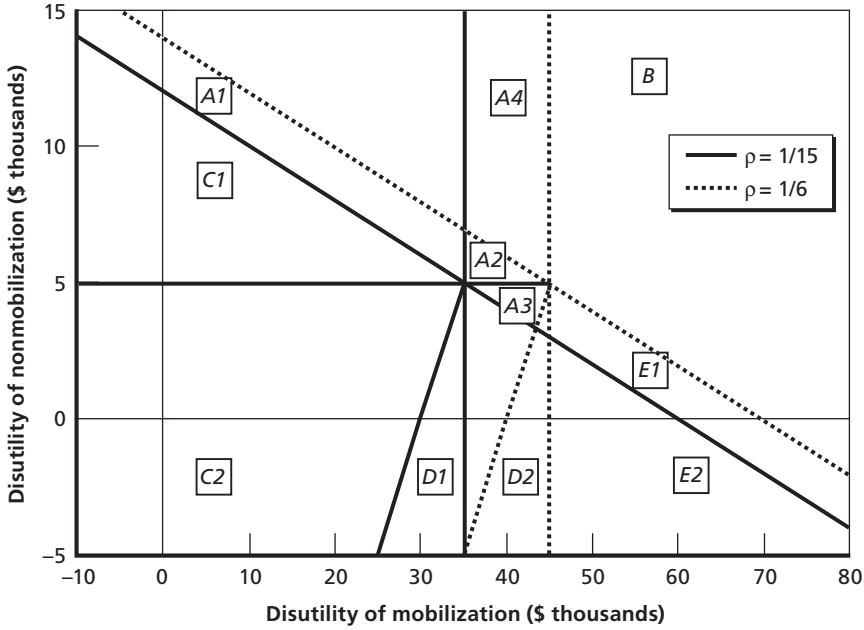
the negatively sloped line shifts down by much less, $\left(\rho/_{1-\rho}\right)\Delta_A$. As plotted, $\rho = 1/6$, so $\left(\rho/_{1-\rho}\right) = 0.2$.

We argue in the body of the monograph that this option may not work. It will make the actives more attractive as well. In net, it may decrease reserve supply.

Option (iii)—raising the mobilization pay of reservists *only*—is plotted in Figure B.5. We now have the following three equations for the borders:

Figure B.4
Effect on the Reserve Enlistment/Reenlistment Decision of an Increase in Active-Duty Pay (received by both members of the active force and by mobilized reservists)



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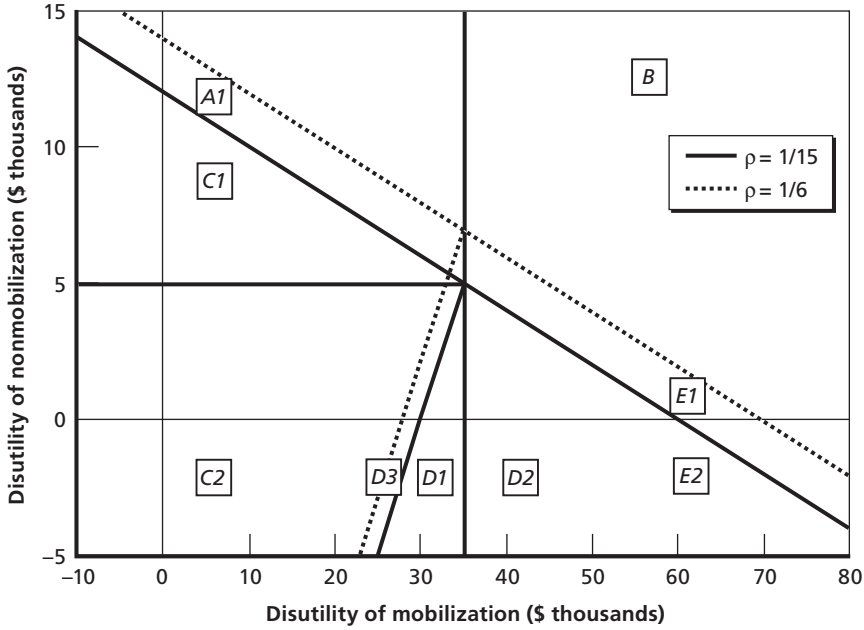
$$
\begin{aligned}
& m_A > \left(\tau_A + y_C\right) \\
& \tau_N < \left\{\frac{\rho}{1-\rho}\left[m_A + \Delta_A\right] + m_N\right\} - \frac{\rho}{1-\rho}\left(\tau_A + y_C\right) \\
& m_A - \tau_A < \rho\left(\left[m_A + \Delta_R\right] - \tau_A\right) + \left(1-\rho\right)\left(y_C + m_N - \tau_N\right), \quad \text{so} \\
& \tau_N < \left(m_N - m_A\right) + \frac{\rho}{1-\rho}\Delta_R + \left(\tau_A + y_C\right)
\end{aligned}
\tag{B.10}
$$

i.e., the vertical and horizontal lines remain unchanged. The negatively sloped diagonal lines shift right by Δ_A. On the vertical scale, the posi-

tively sloped line shifts up by Δ_A, while the negatively sloped line shifts down by much less, $\left(\rho/_{1-\rho}\right)\Delta_A$. As plotted, $\rho = 1/6$, so $\left(\rho/_{1-\rho}\right) = 0.2$. Although pay of the reserves while mobilized increases, pay of the actives does not change, so no one switches from the reserves to the actives. Instead, some people switch from the actives to the reserves.

This approach will unambiguously raise reserve supply. It will, however, lower active supply. Some of the increased supply is drawn from people who would otherwise have joined the actives; other components of the increased reserve supply are drawn from people who would otherwise be civilians. This change in compensation would have the desired effect of lowering underpaying of reserves during mobilization.

Figure B.5
Effect on the Reserve Enlistment/Reenlistment Decision of an Increase in Pay for Mobilization (to reservists only; holding pay to AC forces unchanged)



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